WIRE

MAY 1941

AND WIRE PRODUCTS

Are your schedules hard and fast these days? With every outdated machine in your plant a potential upset to production, you need the protection of modern VAUGHN Equipment . . .
FOR FASTER, SAFER, TROUBLE-FREE WIRE PRODUCTION UNDER ALL CONDITIONS
VAUGHN
COMPLETE WIRE DRAWING EQUIPMENT . . . CONTINUOUS OR SINGLE HOLE . . . FOR THE LARGEST BARS . . . FOR THE SMALLEST WIRE . . . FERROUS, NON-FERROUS MATERIALS OR THEIR ALLOYS.
Vaughn
WIRE DRAWING MACHINERY
THE VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO, U.S.A.

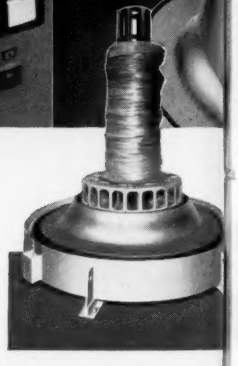
OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

FOR SPHEROIDIZING ROD OR WIRE!

WILSON

offers experience

• The Wilson Annealing Unit is covered by Patents Numbers 1952402, 2068477, 2078356, 2081612, 2089843, and other patents pending.

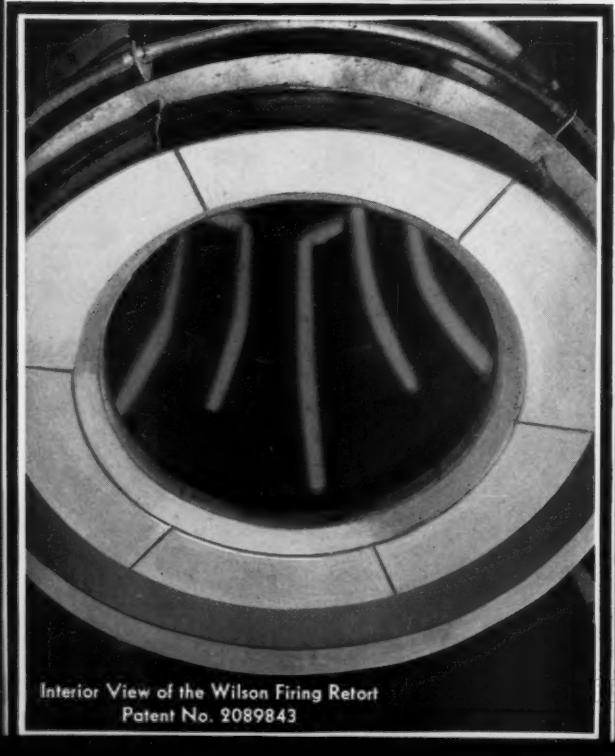


AND THE FURNACE OF THE FUTURE

7 of these New Furnaces Operating—
7 More Under Construction

WITH *Radiant Tubes* IN THE INNER COVER

- Lowest fuel rates available
- Tube life as long as furnace
- Temperature differential between tubes and steel decreased 200°
- Faster heating
- Adaptability to controlled cooling rates



Interior View of the Wilson Firing Retort
Patent No. 2089843

An Exclusive Development of

LEE WILSON ENGINEERING CO.

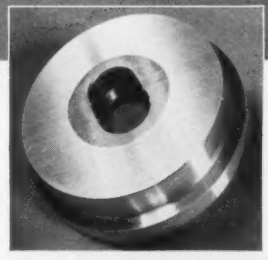
1370 Blount Street • Cleveland, Ohio

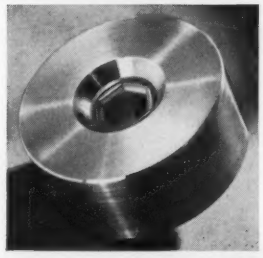
SOLD BY THE WEAN ENGINEERING CO., INC., WARREN, OHIO

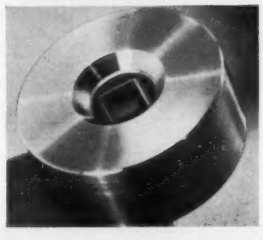
YOU CAN FINISH SQUARE, HEX AND SPECIAL SHAPE CARBOLOY DIES IN YOUR OWN MILL

In 5 to 15 hours!

from pre-formed nibs WITH THIS EQUIPMENT







● With Carboloy shape die finishing equipment, *plus* cored (pre-formed) nibs you can now finish Carboloy shape dies—squares, hex's and special shapes—in your own mill in 5 to 15 hours.

One mill reports production finishing of ovals, size .080 x .062, *from rounds,* in less than an hour per die! Another finished a pre-formed 1⅜" hex burnishing die in 6 hours. Everywhere this new equipment is in use, enthusiastic reports indicate a high order of time saving and cost saving.

The result has been the rapid extension of carbide shape die use from a few limited large production applications, to a large number of special shapes and short run applications.

Write for complete details today.

CARBOLOY COMPANY, INC., DETROIT, MICHIGAN
CHICAGO • CLEVELAND • NEWARK • LOS ANGELES • PITTSBURGH
PHILADELPHIA • WORCESTER, MASS.
Authorized Distributors: Canadian General Electric Co., Ltd., Toronto, Canada
Hartley Wire Die Co., Thomaston, Conn.

The Mark of CARBOLOY
REG. U.S. PAT. OFF.

CARBOLOY

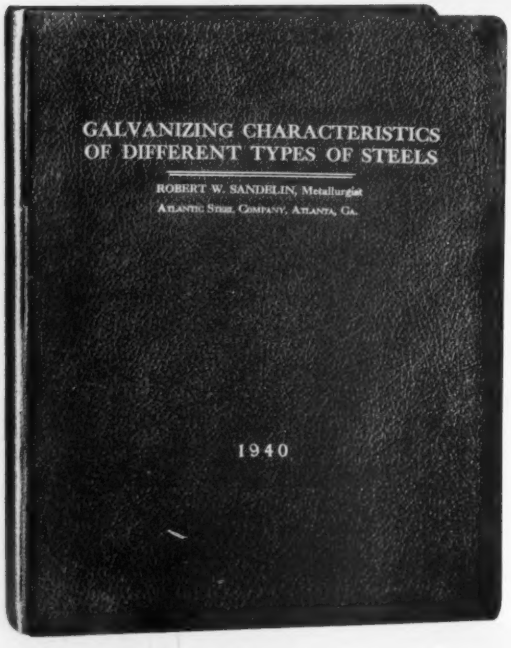
REG. U.S. PAT. OFF.

DRAWING AND SIZING DIES

WIRE ASSOCIATION MEMBERS

ARE INVITED TO SUBMIT PAPERS
FOR CONSIDERATION FOR THE
1941 MEDAL AWARD!

THE
WIRE · ASSOCIATION · AWARD
ROBERT · W · SANDELIN
1940
IN · RECOGNITION · OF · HIS · MERITORIOUS
CONTRIBUTION · TO · THE · ADVANCE
OF · THE · INDUSTRY



"GALVANIZING Characteristics of Different Types of Steels" was judged the most meritorious paper presented during 1940 and its author, R. W. Sandelin, Chief Metallurgist of the Atlantic Steel Co., Atlanta, Ga., received the Wire Association's Medal Award at its annual meeting in Cleveland last October.

✦ ✦ ✦

FOR his paper, Mr. Sandelin completed a series of galvanizing experiments in which he gathered data on appearance, bend tests and strip tests on over 200 samples. In addition, metallographic experiments were made to determine the nature of various types of coatings followed by work to determine the difference in the diffusion rates of the various steels.

✦ ✦ ✦

SINCE its presentation at the meeting, the paper has been published, in its entirety, in Wire and Wire Products, official publication of the Association, and requests for copies have been received from many parts of the world.

✦ ✦ ✦

AN earlier paper by Mr. Sandelin, entitled "A Metallurgical Study of the Factors Affecting the Quality of Galvanizing," received honorable mention by the Association in 1937.

SELECTION of papers to be presented at the Annual Convention rests in the hands of the Joint Programme Committee of the Wire Association.

FOR DETAILS OF THE MEDAL AWARD ADDRESS

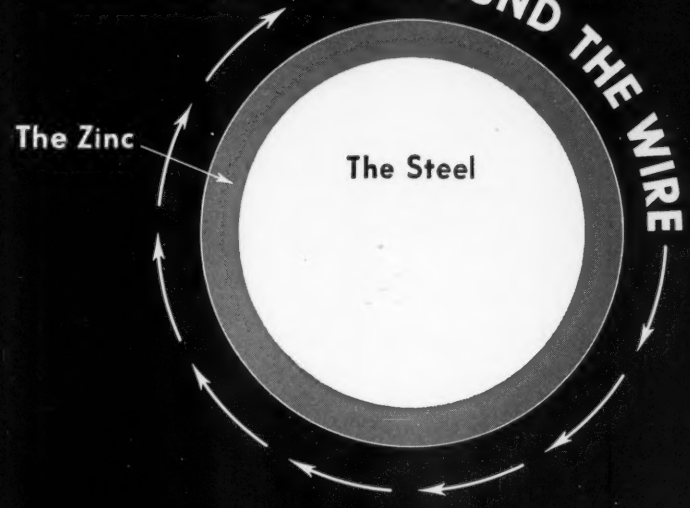
Richard E. Brown
Secretary
The Wire Association

ALL papers submitted become the property of the Wire Association, and the Board of Directors constitutes the Committee on Awards.

STAMFORD TRUST CO. BLDG.

STAMFORD, CONNECTICUT

A Flake-proof COATING



Bethanized manufacturer's wire can be wrapped around its own diameter, bent flat back upon itself, drawn through dies to a fraction of its size without flaking the zinc coating or harming it in any way. If you fabricate zinc-coated wire into any shape—wire baskets, wire toys, wire fabric, chain—try bethanized wire and see for yourself how it undergoes even severe forming operations without damage to the coating.

Then, when it comes to protection against corrosion, bethanized wire scores again. Applied by electricity, the zinc is automatically uniform in thickness both *along* and *around* the wire. This highly uniform coating may be obtained twice or three times as heavy as standard double-galvanizing. A bethanized coating, in the above double and triple weights, will outlast ordinary zinc coatings when exposed to corrosion.

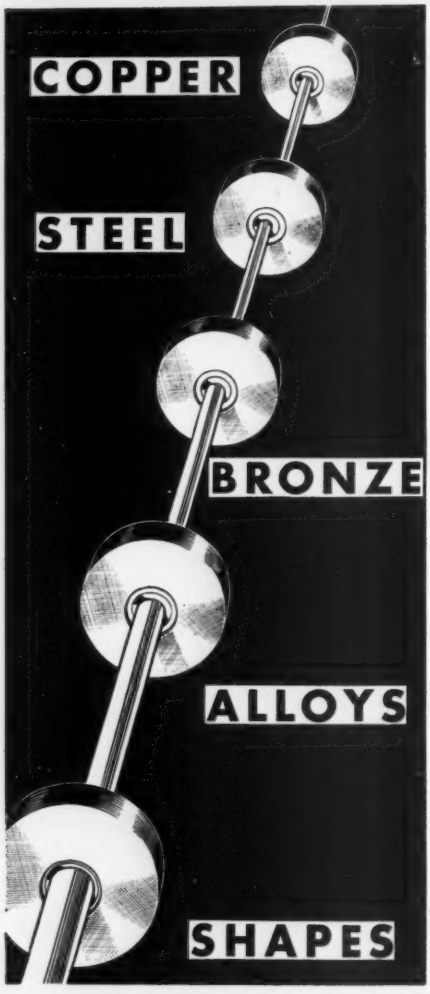
If you now use zinc-coated manufacturer's wire, or fabricate bright wire and then apply the zinc yourself, we suggest that you investigate the advantages of bethanized wire. A letter to Bethlehem Steel Company, Bethlehem, Pa., will bring descriptive literature to you promptly.

BETHANIZED WIRE

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

PRIORITY!



Priority Orders Deserve Priority Dies

More mills realize the true economy of drawing wire with Vascoloy-Ramet Dies.

Today, with equipment operating at maximum capacity on defense materials, rejections, shutdowns, unnecessary die re-cutting must be kept at a minimum.

Now, more than ever, you cannot afford to lose the additional production which can be gained with Vascoloy-Ramet Dies.

Call in a Vascoloy-Ramet factory representative and get his suggestions.

VASCOLOY-RAMET CORPORATION

NORTH CHICAGO, ILLINOIS

An affiliate of

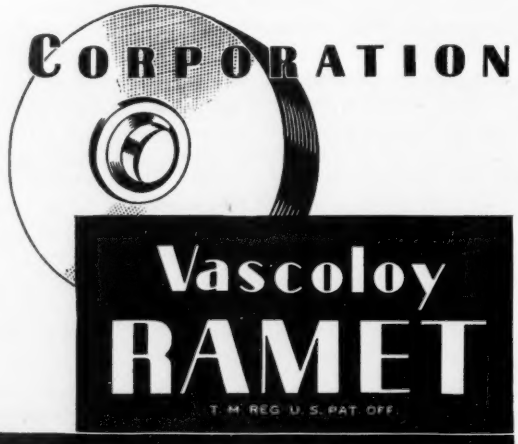
FANSTEEL METALLURGICAL CORPORATION

and

VANADIUM-ALLOYS STEEL COMPANY

Factory-Owned Branches: Jersey City . . . Detroit . . . Cleveland . . . Buffalo . . . Syracuse . . . Pittsburgh . . . Cincinnati . . . Hartford . . . Providence . . . Philadelphia . . . St. Louis . . . Milwaukee

In Canada: Carbide Tool & Die Company, Ltd., Hamilton, Ont.



THE SUPERIOR TANTALUM-TUNGSTEN CARBIDE DIES

SEYMOUR Phosphor Bronze

A SCIENTIFIC ALLOY OF COPPER, TIN AND PHOSPHORUS THAT TAKES THE OUT OF MECHANICAL PERFORMANCE

HIGHLY CORROSION & FATIGUE RESISTANT • DEAD SOFT • SPRING HARD • FREE CUTTING

DOES your product "bog down" too often in the user's hands, due to the failure of some vital spring, cam or slide? Make the offending member of Seymour Phosphor Bronze and you may eliminate this "bottle neck" in performance! The principal characteristics of this alloy are non-corrodibility, toughness, and extreme fatigue and abrasion resistance. It takes any hardness from dead soft to a lively spring temper. It is practically indifferent to thermal change and develops no appreciable "arc" or spark. May also be had leaded for free cutting.

It is ideal for springs that must undergo constant flexure under hot or damp conditions. Because of this high "fatigue" resistance it is about the only alloy suitable for electric switch contact springs. Its non-corrodibility makes it excellent for cams, slides, bearings and threaded members that must not "freeze" in service. Yes, for keeping a mechanism going indefinitely under adverse conditions, Seymour Phosphor Bronze is often the best kind of "trouble insurance." Samples and catalog sent on request.

THE SEYMOUR MFG. CO., 62 Franklin St., Seymour, Conn.

SHEET
WIRE
ROD

TIME-TESTED
WELDING ROD

IN GRADES A, C, D, E

Your Jobber Can Supply It

For new conceptions of STAINLESS WORKABILITY!

The use of Stainless Bars and Wire is essential in many phases of current vital production.

Workability is a *prime requisite*—for machining, cold heading, welding, weaving, and other fabricating processes.

To *Pittsburgh Stainless* Bars and Wire, 40 years of specialized experience in wire manufacturing, research and development, has brought *new conceptions* of *stainless workability*. In many cases its fabrication compares favorably with ordinary carbon wire. Complete control over its manufacture—from ore to final inspection, by one organization—assures its continuous *dependability* and *uniformity*.

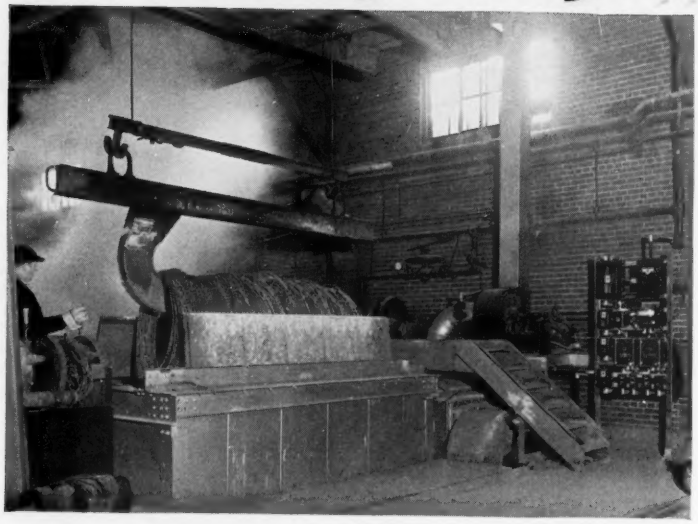
New methods of control, enlarged production facilities, and even greater vigilance in inspection, make *Pittsburgh Stainless*, more than ever, the choice for trouble-free production! Inquires invited.

PITTSBURGH STEEL COMPANY
1641 GRANT BLDG. • PITTSBURGH, PA.

New York Detroit Chicago Cleveland
Houston Los Angeles Tulsa

Pittsburgh Stainless Wire

Serving England!



THESE TEST FIGURES

made at

JOHNSON & NEPHEW LIMITED

SUPPORT OUR CLAIMS FOR CARL-MAYER *Speed*

3 and 2¾ Minutes

Every minute means so much to Johnson & Nephew, Limited, — and England—that they chose Carl-Mayer Ovens for faster and better rod baking.

Carl-Mayer Hi-Speed Rod Bakers, patented and patents pending, are selling themselves on their merit and amazing fuel economy. Another of their important advantages is the Patented Blow-Off Feature which removes moisture without bumping or agitating the coils. Write for full particulars NOW.

RECENT INSTALLATIONS IN U. S. A. AND CANADA & ENGLAND

- Allegheny-Ludlum Steel Co.
- Atlantic Wire Co.
- Johnson & Nephew, Limited
- Pittsburgh Tool Steel Wire Co.
- Steel Company of Canada
- Wickwire-Spencer Steel Co.

"ROD BAKER" JOB - Rd. Johnson & Nephew

Preliminary warming up and trial on 18th, showed that with approximately 2,600 ft. gas per hour, the Baker would reach required temperature (614°F) and the first trial rods (fully loaded pin) were dried satisfactorily in 3 and 2-3/4 minutes even if charged into the Baker dripping wet from Lime Tank.

This in presence of Mr. Bedson.

It was decided to run the Baker on production Saturday 19th.

Lit up 8.20 a.m. Meter = 11760

530 B.t.u. Gas

PIN NUMBER	/WEIGHT (RODS ONLY) T.	C.Q.	lbs.	/TIME IN	/TEMP°F.	/TIME OUT	/TEMP°F.	/TIME/METER & PER PIN	REMARKS
1				8.51	540	9.00	580		
2	1.	5.0	0	9.04	590	9.10	610	9 mins.	11,760
3	1.	9.1	0	9.17	610	9.21	615	6 mins-Main Pressure 4¼	
4	1.	9.2	0					4 mins-Gas Pressure =3-3/4"	
5	1.	14.3	10	9.23	620	9.28	620	No. 1 Baker off.	
6	1.	3.0	0	9.33	615	9.35	620	5 mins 14,360 = 2600 ft. hour	
7	1.	6.0	0	9.44	620	9.59	625	2 mins. Gas Pressure = 3-3/4" after No. 1 Baker lit up	
8	1.	3.2	0	10.02	620	10.16	624	14 mins.(Main Pressure = 3-3/4")	
9	1.	10.0	0	10.21	620	10.25	624	14 mins.(waiting for truck or H.C.Steel	
10	1.	6.0	0	10.27	615	10.30	610	4 mins.	
11	1.	12.0	0	10.30	-	-	-	3 mins. - 2800 cu. ft. hour	
12	1.	6.2	0	10.40	610	10.43½	600	17,250 at 10.23 approx.	
13	1.	6.0	.20	10.45	610	10.47	600	3½ mins.	
	1.	5.0	0	10.52	625	-	-	2 mins.	
14	1.	5.3	12	11.01	550	11.03	-	- 18880. shut down to	
15	1.	4.2	6	11.04	600	11.06	590	instruct their man to light up	
16	1.	2.0	18	11.07	590	-	585	2 mins.	
17	1.	6.0	0	11.14	590	-	590	2 mins.	
calculated on avge.								-	
18	1.	6.3	0	11.18	590	11.22	580	-	
Total 24.		2.0.10/		/8.51 to 11.22/				4 mins. 20.600 shut down	11.36

= 2⅔ hours/working/from 3 hours lit up

Output during working time = 9 tons 13 cwts. per hour

Gas used during working time = 6,700 cu.ft. (Total gas

Gas used during heating up = 1,340 cu.ft. (- 8,740 cu.ft. per hour

Gas used after working time = 700 cu.ft. (average = 2,680

Gas per ton working time = 278 cu.ft.

Gas per ton & heating up) = 329 cu.ft.

Note: Hourly tonnage and gas per ton will obviously depend on proportion of Mild and High Carbon Steel Rods baked. The latter requiring a longer time (up to 18 mins. per batch) to De-Hydrogenate and/or "blue".

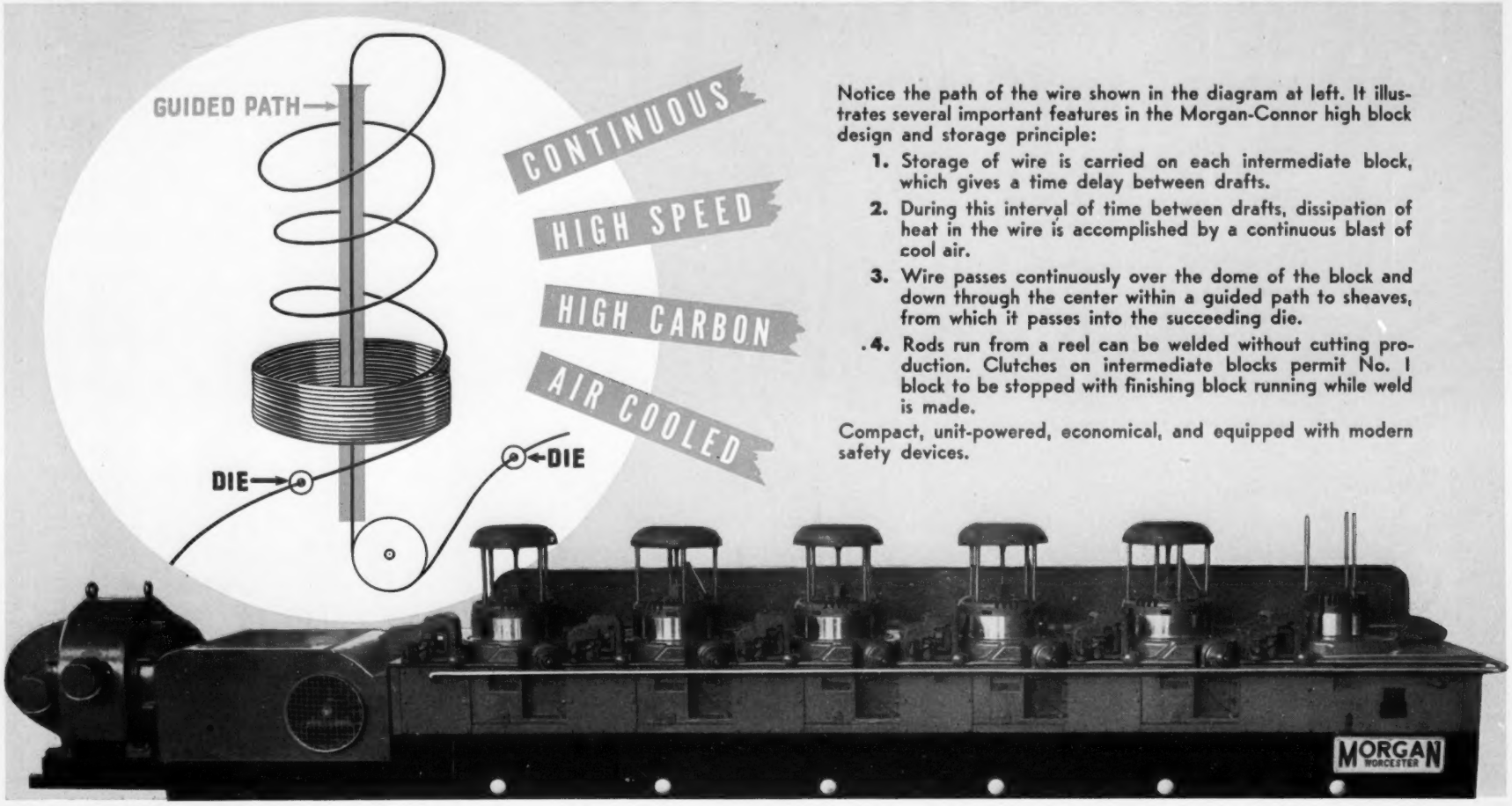
Note: This figure will vary according to proportion between heating up time and total hours work i.e. would be less taken on 1 light up and a full day's operation.

CARL-MAYER HI-SPEED TRADE MARK ROD BAKER

CARL-MAYER CORPORATION, 3030 EUCLID AVE., CLEVELAND, O.

Industrial Ovens, Rod Bakers, Industrial Furnaces, Welding Rod Ovens

MORGAN-CONNOR WIRE MACHINES



Notice the path of the wire shown in the diagram at left. It illustrates several important features in the Morgan-Connor high block design and storage principle:

1. Storage of wire is carried on each intermediate block, which gives a time delay between drafts.
2. During this interval of time between drafts, dissipation of heat in the wire is accomplished by a continuous blast of cool air.
3. Wire passes continuously over the dome of the block and down through the center within a guided path to sheaves, from which it passes into the succeeding die.
4. Rods run from a reel can be welded without cutting production. Clutches on intermediate blocks permit No. 1 block to be stopped with finishing block running while weld is made.

Compact, unit-powered, economical, and equipped with modern safety devices.

MORGAN WORCESTER ENGINEERS AND MANUFACTURERS

Continuous Wire Drawing Machines; Take-up Frames; Horizontal Bull Blocks; Vertical Spindle Bull Blocks; Reels; Pointers; Wire Mill Accessories.

W-61

MORGAN CONSTRUCTION COMPANY, WORCESTER, MASSACHUSETTS

WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING—ROLLING—EXTRUDING—FORMING—FABRICATING

Vol. 16 MAY, 1941 No. 5

Designated as

Official Publication By The Wire Association

Contents

The Impact of War on the Wire Industry ..... By Kenneth B. Lewis 271

Wire-Making Experiments With Sintered Copper — Part II ..... By Claus G. Goetzel, Ph.D. 274

Fatigue Tests on Zinc-Coated Steel Wire ..... By D. G. Watt 280

"Military Inspection of Materials" Features Pittsburgh Regional Meeting ..... By Richard E. Brown 286

More About the Fine Die Problem 298

Attendance List — Pittsburgh Regional Meeting 299

Outstanding Personalities of the Wire Industry 289

American Iron & Steel Statistics — February, 1941 290

Exports & Imports of Wire 291

A Review of Recent Wire Patents 296

Index to Advertisers 313

Where to Buy 313-314-315-316

—ASSOCIATE EDITORS—

Kenneth B. Lewis, Consulting Wire Mill Engineer
W. H. Spowers, Jr., Consultant on Galvanizing
Lancaster, Allwine & Rommel, Consultants on Patent Information

Richard E. Brown, General Manager
R. S. Spengel, Business Manager
E. D. Sickels, Advertising Manager

Publication Office: Washington, N. J.
Executive Office: Stamford Trust Co. Bldg., 300 Main St., Stamford, Conn.

Annual Subscription, U. S. $5.00, Canada $5.00

50 Cents a Copy in U. S. Issued Monthly Foreign, $7.50

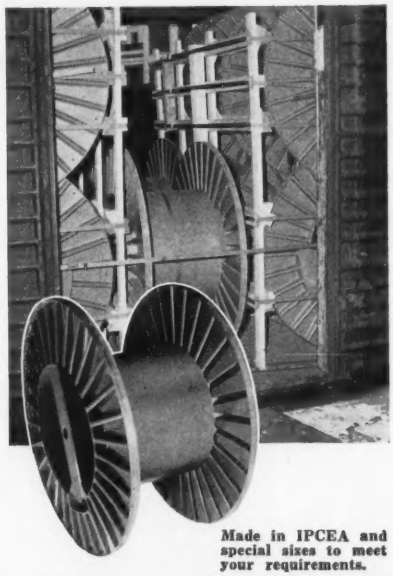
October Convention Issue $1.00 a Copy
January Convention Discussions Issue $1.00 a Copy

Copyright 1941, Quinn-Brown Publishing Corp. WIRE AND WIRE PRODUCTS is fully protected by copyright and nothing that appears in it may be reprinted wholly or in part without permission.

WIRE & WIRE PRODUCTS. Vol. 16, No. 5, May, 1941, Executive Office, 300 Main St., Stamford, Conn. Published by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Secretary and Treasurer. Publication office, 13 West Church Street, Washington, N. J. Subscription price: U. S., $5.00; Canada, $5.00 per year, 50 cents per copy; Foreign, $7.50 per year. Entered as second class mail at the Post Office, Washington, N. J., under Act of March, 1879.

Stevens

LOW-TARE
Shipping Reels
and
FLANGED STEEL DRUMS



Made in IPCEA and special sizes to meet your requirements.

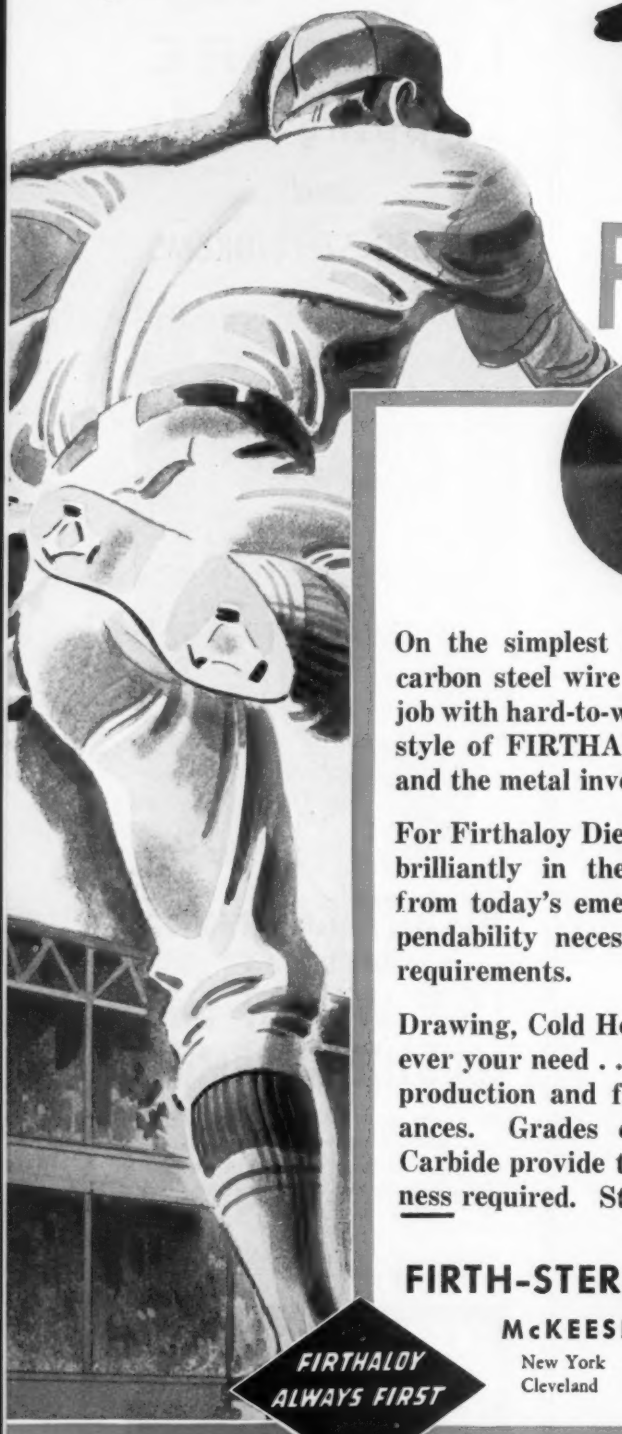
ALL STEEL Construction
PROVIDES
LOW WEIGHT and
LONG LIFE ECONOMIES

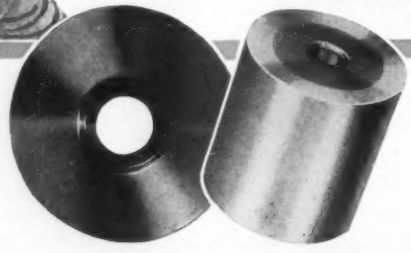
They are built to last—sturdy at the hub, and engineered with shock absorbing characteristics to withstand side stress. Write for interesting data and prices.

Manufactured under license arrangements with Western Electric Company, Incorporated

THE STEVENS METAL PRODUCTS CO.,
NILES, OHIO

BRILLIANT PERFORMERS IN THE *Toughest Spots* FIRTHALOY DIES





On the simplest straight production run of ordinary carbon steel wire . . . or for the toughest cold heading job with hard-to-work alloys . . . there is a grade, size and style of FIRTHALOY Die to meet and master the job and the metal involved.

For Firthaloy Dies combine that rare ability to perform brilliantly in the toughest production spots, arising from today's emergency needs, with the consistent dependability necessary for the more usual day-by-day requirements.

Drawing, Cold Heading, Forming, Extruding . . . whatever your need . . . depend on Firthaloy for trouble-free production and fast, low-cost operation to close tolerances. Grades of Tungsten, Titanium or Tantalum Carbide provide the exact degree of hardness or toughness required. Standardize on FIRTHALOY!

FIRTH-STERLING STEEL COMPANY

McKEESPORT, PENNSYLVANIA

New York Chicago Hartford Philadelphia
Cleveland Detroit Dayton Los Angeles

FIRTHALOY ALWAYS FIRST

FIRTH-STERLING FIRTHALOY QUALITY

FIRTHALOY SINTERED CARBIDE DIES

PREMIUM VALUE AT NO EXTRA COST!

WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING --- EXTRUDING --- FORMING --- FABRICATING

Vol. 16 MAY, 1941 No. 5

The Impact of War On The Wire Industry

By Kenneth B. Lewis,
Consulting Engineer,
Worcester, Mass.

Editor's Note

The opinions expressed in this article while necessarily those of the individual reflect very largely the prevailing opinion of informed men in the United States today. ✦ ✦ The need for national unity is great. The plea is made by government for national unity and men in all walks of industry are more than anxious to participate in an effort to create such national unity. ✦ ✦ ✦ The Government must obtain and be able to hold the confidence of men in all walks of life and all phases of industry to create such unity. This the author brings out very fully and it is something which thinking men must give serious consideration to in this critical moment of our history.

A UNIVERSAL trait of human nature is the delight we take in publicly pointing to the fulfillment of our prophecies. The writer predicted, a few days after the start of the present struggle, that its effect on the wire industry would be quite different from that of the World War, because it would be a different kind of war. This really was not a risky prediction for one to whom history is a hobby, for wars are continually changing, sometimes by reason of purely military developments but oftener, in recent times, as a result of technical advances in industry.

✦ ✦ ✦

THERE'S nothing really new under the sun. A very early technical change affecting warfare permitted the Hittites to make a marvelous showing against the powerful Kingdom of Egypt. The Hittites, a small tribe, had deposits of iron ore, and were skilled in working them. Contemporary historians comment on the fact that the Egyptian weapons, both tactile and missile, were so badly bent and blunted after one contact with shield or bone that they must be straightened on the anvil, while the Hittite weapons remained straight and sharp. The Egyptians imported brass and iron, but the Hittites had begun to play with carburizing and quenching.

✦ ✦ ✦

AMONG the larger milestones on the road of military conquest are the Macedonian phalanx and the Roman Testudo. Both were in effect human tanks, the former proof against tactile, the latter against missile weapons. Alexander rode to power on one, Caesar on the other. They were, in their day, as formidable as anything that ever came out of Germany. The intensive development of missile weapons broke the phalanx; what broke the testudo I do not recall, but an answer was found.

✦ ✦ ✦

AT Hastings in 1066 the hardened and disciplined Saxon spearmen were helpless against a weapon new in warfare, the Norman bow, and were mowed down by a foe with whom they could not come to grips. Promptly a reconstituted England, Norman culture grafted on a Saxon base, developed a super-weapon in the famous English long-bow, and rode high over the continent of Europe until the advent of gunpowder.

✦ ✦ ✦

DOWN the centuries blitz-kreigs have come and gone. Perhaps the best documented was that of Napoleon, whose campaigns are particularly interesting now because of their close parallel to Hitler's. The revolutions he wrought in weapons and tactics were as devastating as any in history, ancient or modern.

✦ ✦ ✦

IN the 17th and 18th centuries war was a rather sedate series of maneuvers bearing little discernable relation to civil affairs. In Queen Anne's day it was pos-

Designated as Official Publication by the Wire Association

sible for two hostile armies to creep sluggishly around in the same neighborhood for several years without actually clashing in battle more than two or three times. When finally a meeting seemed unavoidable, a battle ground was chosen by formal or informal concurrence, and borrowed oxen were employed to drag into place the ponderous brass and iron cannon. Then the oxen went back to the plow.

✦ ✦ ✦

BOUNDARIES, hazards, ground rules, and other details were tacitly agreed upon, and after a ceremonial cannonading, which seems to have interested nobody but the technicians, the armies crawled into position and slugged away at close range until honor was satisfied.

✦ ✦ ✦

PICKING it up at this point, Napoleon made warfare unrecognizable to its friends, and no army could stand against him until it had copied his innovations. Mobility was his ace of trumps. He introduced the conception of artillery as a part of the striking force, artillery which actually accompanied and cooperated with marching troops. He introduced the conception of cavalry not as a reconnaisance unit, an emergency arm, or a refuge for high born personnages too lofty to walk in the mud, but as a highly mobile mass of great striking power, capable of initiating and independently carrying out large enterprises. To implement these new policies he built the network of cobble-stoned roads on which many of us have jiggled and cursed.

✦ ✦ ✦

AS popular education has spread and communication has improved, and the issues dividing nations have become more widely understood, war has tended to slip away from the exclusive concern and responsibility of professional soldiers and become the intimate affair of entire populations. With the increase of mobility the role of the general populace tends to shift from that of spectator to participant. The line between army and populace becomes very thin, and there is a constant interchange of views between the military and the civil branches.

✦ ✦ ✦

THERE is a very human reluctance on the part of the military man to stick out his neck experimentally in a project so final as war. But the officer trained in civil pursuits accepts constant change and improvement as a natural and necessary condition of survival. The military man, in the depths of his soul, still looks upon war as a game, in which, while a certain amount and kind of chicanery is legitimate, revolutionary changes in mid-campaign are not quite sporting. The ex-civilian wants to get the whole thing over, the quickest possible way, and get back to the mill.

✦ ✦ ✦

THESE conflicting philosophies react on each other, and I think that is why recent wars have seen such violent changes in practice, and why, if we are so unlucky as to live to see another, it will look nothing like this one. Changes in warfare down the centuries seem to have stemmed from a greater participation of civilians, a greater subordination of industry to military needs, and, as the chief result, an enormous increase in mobility. Napoleon's ace of trumps was the horse; the outstanding achievement of 1914 was the saving of Paris by Gallieni's army in taxicabs; Hitler's ace is the internal combustion engine.

✦ ✦ ✦

THE war babies of the wire mill in 1914-1918 were barbed wire and wire rope. The tank rang the bell on the barbed wire entanglement, for all who had ears to hear. The tactics which put the whole European coast into German hands washed out the anchored mine and the submarine barrier net.

✦ ✦ ✦

IN any discussion of the specific effect of this war on the wire industry one is confronted by the fact that those details which are of interest are of a nature which forbids open discussion, and those whose publication would be harmless are too well known or too insignificant to be worth a paragraph. Barb wire, as the writer predicted, is not a factor. It has been a brisk item, but only because agricultural countries long dependent on European wire mills have been trying to fill their needs here. Their frank comments on our prices and terms would be very interesting.

✦ ✦ ✦

WIRE rope, the other war baby, enjoys a real war boom, which, however, is due less to any novel or direct war application than simply to the rising tempo of industrial activity, including of course ship-building, both naval and commercial. A couple of special lines, airplane strand and field telephone cable, are large factors in dollars, but, for obvious reasons, small tonnage factors. It can be said in a general way that those wire items going direct into war goods are characterized by extremely small weight per unit and extremely important function. Some of them will make interesting paragraphs after the war.

✦ ✦ ✦

WHILE the anti-submarine nets woven of wire rope are out of the picture, most wire men know that another hand of their industry is directly involved in this field, and that the nets have not disappeared but are bigger, better, and cheaper than ever.

✦ ✦ ✦

IT is difficult to name a single wire grade or product whose demand has not greatly quickened in the past years. Some of this increase can be traced indirectly but accurately into weapons of offense or defense. If a certain auto manufacturer doubles and triples his orders for lock makers it does not require a priority certificate to indicate that he is speeding up on tanks. If a hitherto unknown contractor whose wife's relatives are temporarily domiciled in the District of Columbia starts ordering wire nails by the dozen of carloads, and fly screening by the millions of feet, you smell a cantonment. If an erstwhile road-builder wants thousands of tons of road mesh, not scattered along from town to town, but all delivered at one spot, the picture that haunts the mind is of curbase runways. Now that priorities have

begun to appear the strain on the imagination will lessen.

✦ ✦ ✦

IN the matter of supplies, the hardest pinch so far has been zinc, whose situation is expected to straighten out in July. In the meantime a certain galvanizer who works from the leached ore, of which he has two years supply, is smiling happily, and gently raiding the desirable accounts of competitors. Shortages of nickel, cobalt, cadmium, and tungsten are bothering some mills a little, and some a lot. Small specialty mills may be hard pressed before the situation eases.

✦ ✦ ✦

OF considerably greater interest than the actual physical situation is the labor and political situation as it affects our industry. Labor and politics may be mentioned in one breath, because labor is now in politics and politics is in labor. Labor troubles are such in name only; actually they are implements of political strategy. Wages, nominal and actual, measured in dollars or in buying power rise steadily, working conditions improve about as fast as the demands can be formulated, and strikes spread like prairie fires. This is **not** labor trouble. In this field, as in others, appeasement is worse than useless, but it is forced upon the employer by what is now a stronger power, the "Government."

✦ ✦ ✦

ONE who carefully sampled the collective mind of wire mill executives and put their thoughts into words would go along somewhat as follows. — (Remember! the writer is not composing, he is only translating).

✦ ✦ ✦

MR. Average Wire Executive, in the first place, does not kid himself that this nation has, or ever had the option of entering or staying out of this war. That decision was made by Hitler, and set forth plainly in "Mein Kampf." We are non-participants only so long as Great Britain holds the umbrella over us. In effect we **are** at war; the only thing that we may possibly be allowed to decide for ourselves is when the shooting starts, and if we want to decide that we had better move quick. He thinks it's a darned shame that the two serious wars of our generation, the wars that have to be fought, not primarily by the military but by the general populace, and particularly by organized industry, should both come upon us in those rare and brief interludes when the country was being purged of its pride by subordination to that political party which, by and large, is without experience in the management of large affairs. He does not mean to disparage that party, (?) that is, not **very** much, but it cannot be denied that there is a large group of worthy citizens whose pursuits do not require them to exercise managerial or financial judgments, and most of them **are** of **that** party.

✦ ✦ ✦

THEY may be marvelous lawyers, doctors, preachers, entertainers, judges, government experts, artists, literary lights, purveyors of personal services. They may be loyal and efficient employees of retail establishments, they may be social workers, amateur or professional. They see suffering, apparently needless and undeserved, and they associate it in their minds with cruelty and oppression. Through no fault of their own, they are never privileged to see or comprehend the workings of our social and economic order in its larger aspects. When the party of construction gets going too fast, a swing of the pendulum lifts these worthy incompetents into the saddle to curb our pride. It's tough luck that it always has to be in war time, a time above all when an efficiently and strongly organized and unhampered industry is of paramount importance.

✦ ✦ ✦

AND this time, doggone it, not only is that party in again, with the toughest of all wars looming up, but it is completely controlled by its wildest, dumbest and most sinister elements, with grants of power which not even **honest** supermen would have wished or accepted.

(The reader is again reminded that those are the thoughts of an artificial person, "Mr. Average Wire Executive." He has no address, and cannot be reached by summonses or subpoenas. Any resemblance between his thoughts and those of any actual person, living or dead, is purely coincidental).

✦ ✦ ✦

THE policy-making agents of his government he finds to be of two classes, the remittance man, (also known as papa's boys) and the social workers. The former are of rich or well-to-do families, and have either grown up in idleness or have had nominal tasks under the paternal eye. **Knowing** their own incompetence, they are obliged to feign omniscience; they can never admit an error or revise a policy. The latter have associated so exclusively with society's misfits and failures that they regard success in any endeavor as abnormal, and worthy of the gravest suspicion.

✦ ✦ ✦

MR. Wire Mill Executive is extremely worried. He is about to be plunged into a foreign war of the utmost intensity and complexity, for which his preparation has been eight years of civil war, in which, battered and bleeding, he has been fighting in heroic rear-guard action. He has been badgered, harassed, hampered, taxed, insulted, abused, and robbed, by those who should have protected and encouraged him. His workmen have been incited to revolt, to riot, to robbery, and to destruction of his property, by and with the express consent and connivance of the highest political figures in the land. His men are sullen, resentful, suspicious and more than a little frightened. Some of them have been planted on him, compliments of Washington, to keep the flames of class hatred alight. The others cannot express or manifest any loyalty to him without getting slugged, nor can he show any interest in them without being hauled before the National Labor Relations Board.

✦ ✦ ✦

MEMBERS of his class have been called into the Government at a dollar a year. He respects and admires them. But he knows that just as each Italian

(*Please turn to Page 295*)

Wire-Making Experiments With Sintered Copper

PART II

By Claus G. Goetzel, Ph.D.,
Assistant Director of Research,
American Electro Metal Corp., Yonkers, N. Y.

Data relating to the preparing of the copper powders, the method of sintering and the production of the wire were discussed in Part I, published in the April, 1941, issue of WIRE & WIRE PRODUCTS.

Electrical Conductivity

THE conductivity was measured on the original compacts and also on the wires produced from them. The wires were tested by means of a Wheatstone bridge.

✦ ✦ ✦

FIGURE 6 a shows a diagrammatical sketch of the electrical conductivity of the wires obtained from copper powder compacts by cold rolling and drawing. All wires for this chart were in the hard drawn condition when tested for their electrical properties. The key and captions indicate the different processing methods used on the compacts and wires. The conductivity of hard drawn "OFHC" wires was used as a comparison. Only wires which were produced from compacts molded from the coarsest powders at high compacting and repressing pressures, sintered in vacuum, and annealed between the first passes in the rolling process, reached the A.S.T.M. specifications of 98% of pure annealed copper.[5] The conductivity of all other specimens was lower the smaller the compacting pressure. The wires developed from the finest electrolytic powders, and from the reduced powder show the lowest results.

✦ ✦ ✦

FIGURE 7 a gives the electrical conductivity for soft annealed wires produced according to the various processing methods. Annealing the wires increased their conductivity to a certain extent, but the general trend is the same as in the case of the hard drawn wires of Fig. 6 a. Only the wires from the coarse powder compacts twice processed at the highest pressure used, namely 45 tons per square inch, met the standard requirements.

✦ ✦ ✦

Tensile Strength and Elongation

IN tensile testing only tensile strength and elongation were determined. Wires were tested in the hard drawn, and the soft, annealed condition. Except for the gauge length, which was 2 in. all specifications of the A.S.T.M. Standards[5] were observed. Comparison tests were also made on wires drawn from cast "OFHC"[4] copper. For the tension tests on the drawn wires a 1000 lbs. Amsler tension machine with a pendulum for load measurements was used.

✦ ✦ ✦

FIGURES 6 b and c and 7 b and c are diagrams showing the tensile strength and elongation of wires drawn from compacts by cold-rolling and drawing. All wires represented in the schematic diagrams of Figs. 6 b and c were in the hard drawn condition, when tested for tensile strength and elongation. The key and captions describe the different processing methods used for the preparation of the basic compacts and of the wires. The corresponding data for wires from cast "OFHC" copper serve as a basis for comparison. As indicated by Fig. 6 b only hard wires produced from compacts of the three electrolytic powders A, B and C molded at the highest compacting and recompression pressures, sintered in vacuum, and annealed between the first steps in the rolling process reach the minimum A.S.T.M. specifications (66,200 lb/in.^{2} for 0.060 in. in diameter)[5]. All other samples were lower in tensile strength, probably because of too great an amount of impurities, pores, or other imperfections. The samples from the fine electrolytic powder LC, and from the reduced powder R, show the least favorable results. Similar trends are shown by the elongation values as Fig. 6 c indicates. The elongation of "OFHC" wires could not be obtained with any of the samples developed from powders, but could be approached by wires produced from compacts of the coarse powders, A and B, twice compressed at 45 tons per square inch and sintered in either hydrogen or vacuum, with several annealings during rolling.

✦ ✦ ✦

THE sketches of Fig. 7 b and c represent data on tensile strength and elongation for soft annealed wires. The wires were developed according to the same processing methods as in Figs. 6 b and c. The standard specification, a tensile strength of 38,500 lb/in.^{2} for 0.060 in. in diameter[5], was met by most of the annealed wires produced from the coarse electrolytic powders and from the reduced powder. Vacuum sintering generally improved the tensile strength of the wires slightly (Fig.

7 b). The chart of Fig. 7 c shows that only wires produced with several intermediate anneals from compacts made from electrolytic powder A, highly compressed and repressed, and sintered and annealed in vacuum, could match the elongation of 'OFHC" wires. The wires developed from compacts of the electrolytic powder LC, and all wires obtained by a direct cold rolling reduction of the compacts into wire size, were especially low in elongation.

✦ ✦ ✦

Twisting and Bending Tests

TWISTING tests were made on hard drawn and annealed wires 0.060 in. in diameter, produced from compacts of the five standard dry powders. The tests were made on a Schopper wire-twisting machine using specimens with 3 in. gauge length. Comparative tests were made on "OFHC" copper wires, obtained by a direct cold rolling and drawing reduction.

✦ ✦ ✦

FIGURES 6 d and 7 d show diagrams for the torsional properties of hard drawn and annealed wires. The key indicates the different processing methods of the test samples, which are the same as in the case of all previous wire tests. In general, the influence of various processing factors on the torsional properties was the same as the effect of those factors on the bending and static elongation tests on the wires, as already noted. Very few irregularities or deviations from the general trend are noticeable. The torsional resistance of "OFHC" wires, however, could be reached only by wires annealed several times during rolling and produced from a double-compressed, vacuum-sintered and annealed compact of the coarsest electrolytic powder A. An extreme inferiority of soft wires obtained by reduction without annealing during rolling, is recognizable.

✦ ✦ ✦

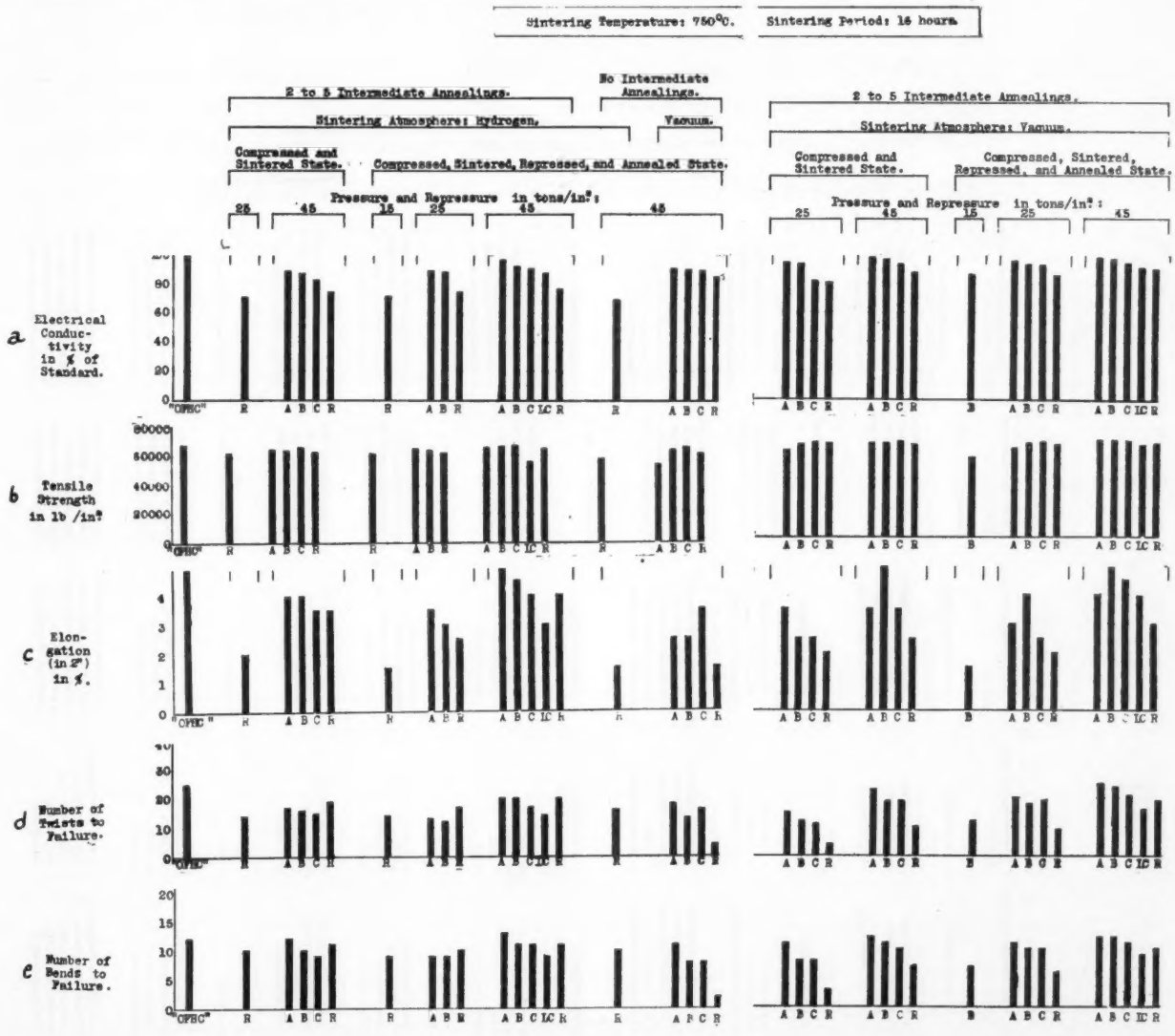

Sintering Temperature: 750°C.
Sintering Period: 16 hours
2 to 5 Intermediate Annealings.
No Intermediate Annealings.
Sintering Atmosphere: Hydrogen,
Vacuum.
Compressed and Sintered State.
Compressed, Sintered, Repressed, and Annealed State.
Pressure and Repressure in tons/in²:
25 45 15 25 45 45
2 to 5 Intermediate Annealings.
Sintering Atmosphere: Vacuum.
Compressed and Sintered State.
Compressed, Sintered, Repressed, and Annealed State.
Pressure and Repressure in tons/in²:
25 45 15 25 45
a Electrical Conductivity in % of Standard.
b Tensile Strength in lb /in²
c Elongation (in 2") in %.
d Number of Twists to Failure.
e Number of Bends to Failure.
"OFHC"
R
A B C R

FIG. 6 Properties of Hard Wires, 0.060", vs. Initial Powders and Type of Procedure.

FOR bending tests on 0.060 in. wires produced from the compacts, a Tarnagrocki wire bending machine was used. The wires were bent back and forth through 180 degrees until they fractured. The number of bends was counted and used as a criterion of the bending ability.

✦ ✦ ✦

FIGURE 6 e is a diagram showing the bending properties of hard drawn wires. The key and the description refer to the different processing methods used for the manufacture of the compacts and final wires. An average value for "OFHC" wires is given for comparison. Again, the tendency noticed previously is recognizable: wires which were produced with several intermediate anneals from those compacts which were compressed from the coarsest powders at the highest compacting and recompression pressures reach the value for directly reduced "OFHC" copper wires. The values for the other samples were lower, the smaller the pressure and the finer the original powder. Reduced powder as basic material was inferior to the electrolytic powders. The properties of wires produced by reduction without annealing were less favorable than the properties of wires from the same material, but annealed during rolling.

✦ ✦ ✦

A RATHER similar trend of bending test results can be observed for soft, annealed wires, as shown in Fig. 7 e. Generally, the number of bends endured by annealed wires is nearly twice as high as in the case of hard drawn samples. Again, very poor results were obtained on soft wires produced by reduction without annealing during rolling from double-compressed, vacuum-sintered and annealed compacts. This phenomenon is hard to explain; it may be traced back to the peculiarity of

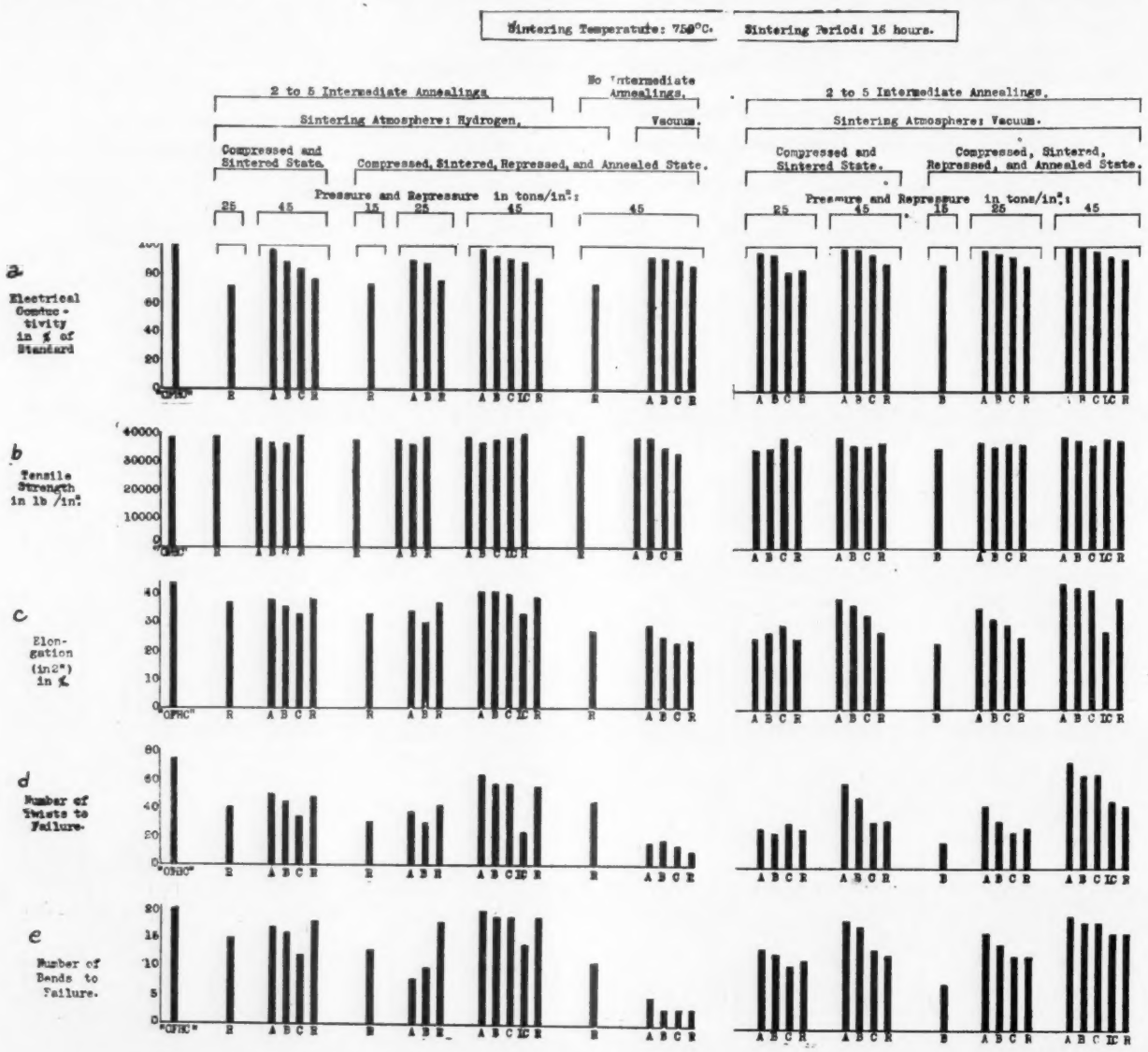


FIG. 7. Properties of Soft Wires, 0.060", vs. Initial Powders and Type of Procedure.

the type of test or to inhomogeneity of the material tested, although average values from duplicate or triplicate tests were taken.

✦ ✦ ✦

Fatigue Strength

FOR the fatigue tests on wires, a high speed rotating wire arc fatigue machine of the **Kenyon** type[6] was used. This device operated by rotating the wire while bent through its natural arc. The wires were rotated at approximately 9000 r.p.m., and were kept submerged in a pan containing mineral-seal oil, which acted as damping medium. Upon fracture, the wire released a mercury balance which interrupted the current of the motor and stopped the test. The hard drawn wires had a length of 10 to 15 inches and a diameter of 0.033 in. they were absolutely straight in order to avoid vibrations and oscillations. The wires were obtained from double-compressed, heat-treated compacts of the five basic powders by rolling and drawing, using several intermediate annealing treatments. All compacts were compressed and repressed at 45 tons per square inch, and were sintered and annealed under vacuum at 750°C. for 16 hours. Comparative tests were also made on hard drawn "OFHC" wires of similar dimensions. Five points, and therefore, five identical wire samples, were necessary for the determination of each curve. Each specimen for a curve was tested under a different load which was governed by adjustment of the radius of curvature, i.e., by changing the angle of the bearings or by changing the distance between the bearings.

✦ ✦ ✦

"S-N curves" for wires from compacts of the five different powders are given in Fig. 8. A comparison curve for "OFHC" wires indicates that the fatigue qualities of all wires from powder compacts were at least as good as that for the "OFHC" material. This is remarkable since only the hard drawn wires produced from the coarse powders, A and B, have a tensile strength equal to that of "OFHC" copper, and the tensile strength of the other wires is slightly inferior (Fig. 6 b). However, the order of the fatigue curves corresponds approximately to that of the results of other tests on wires. In the fatigue tests on wire samples, the coarsest electrolytic powder, A, yields the highest curve, and the fine powders lower curves. The reduced powder curve has an unusual, intermediate position.

✦ ✦ ✦

Summary and Conclusions

THE malleability of sintered copper generally increases with increasing molding pressure. Under the most favorable condi-

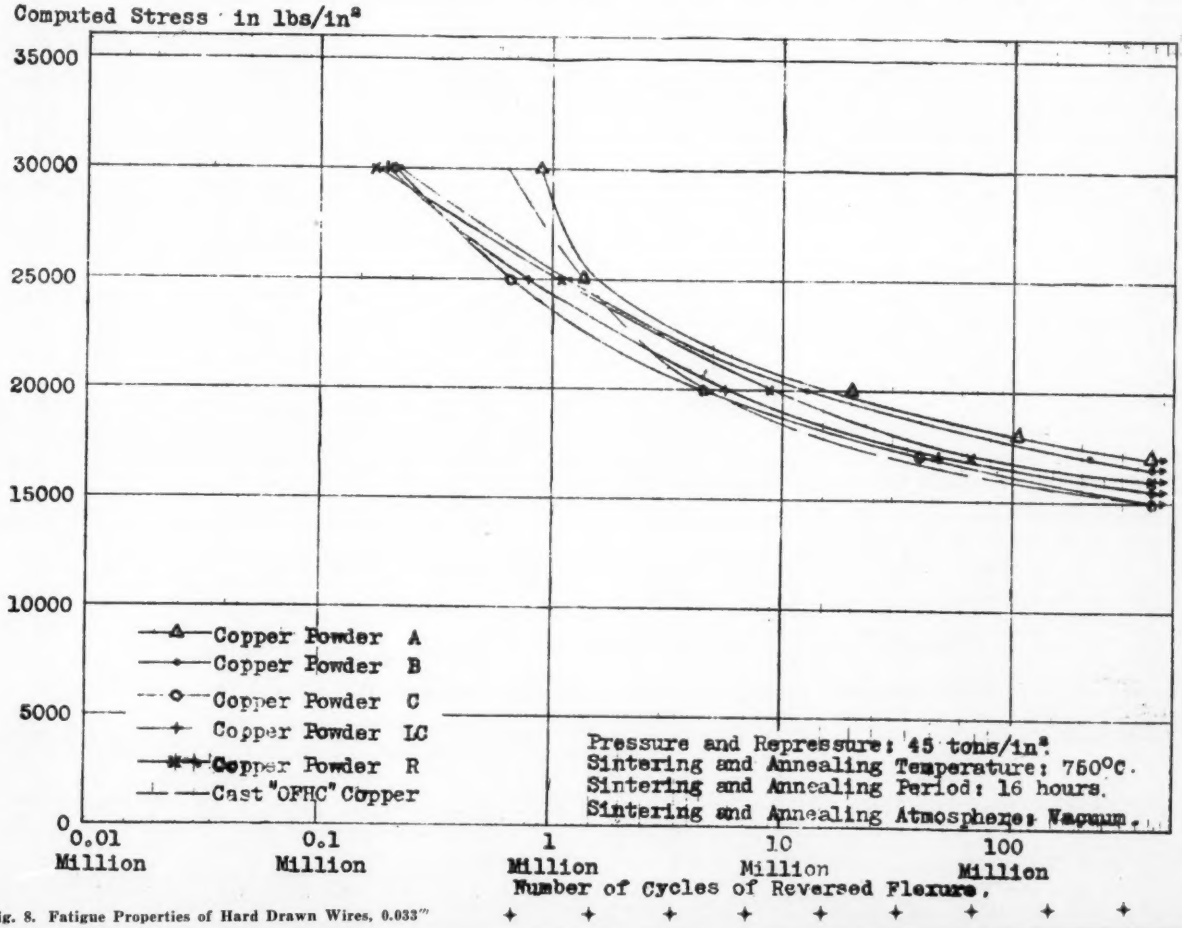


Fig. 8. Fatigue Properties of Hard Drawn Wires, 0.033"

✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦

tions, 15 tons per square inch is the lowest compacting and repressing pressure that will result in malleability sufficient to permit rolling to wire. Hydrogen-treatment of the compacts is less favorable than vacuum treatment except for the reduced powder compacts. This is true despite the presence of a secondary porosity in the vacuum treated material caused by evolution of gases during heat treatment. In the case of vacuum-treated compacts, the coarse electrolytic powders show the best performance while the light-fine powder generally yielded inferior results. Repressing and resintering of the compacts improved their malleability considerably and even permitted cold-rolling to wire size without intermediate annealing, provided that compacting and repressing pressure was not below 45 tons per square inch. Certain irregularities of the curves are common, particularly in the case of the two fine powders.

✦ ✦ ✦

THE A.S.T.M. Standard specifications for electrical conductivity could not be reached or even approached, unless the compacts were rolled and drawn to wires and finally annealed. There is a considerable difference in the conductivity of hard drawn wires. In wires drawn from compacts molded at low pressures, the conductivity is low, chiefly because of the presence of pores. The reduction of the conductivity of wires obtained from highly compressed fine electrolytic powders, and from the reduced powder, on the other hand, is probably caused principally by impurities. Soft annealed wires showed similar trends in their results. In no case did the conductivity of the wires produced from sintered copper reach the high values of "OFHC" copper wires.

✦ ✦ ✦

THE effect of powder grade on tensile strength for either hard drawn or annealed wires made from compacts prepared by the same procedure is such that coarse initial powders yielded better tensile properties than the fine powders. In the case of wires, sintering under vacuum also proved to be superior to sintering in hydrogen. If the proper procedure were employed for the reduction of the wires from the powders, the A.S.T.M. standard specifications of tensile strength and elongation could easily be met. Wires developed by cold reduction proved to be less satisfactory. This fact is understandable, if the severe working of the materials is considered.

✦ ✦ ✦

THE results of the bending tests on hard or annealed wires show trends similar to those observed for their elongation under tension. Only wires obtained from the densest coarse powder compacts, reduced with several intermediate anneals to wire size, could reach the values of "OFHC" copper wires.

✦ ✦ ✦

ALSO the torsion test on wires produced from copper powder compacts show trends almost identical with those of the bending and elongation tests on the same wires. This is understandable, when consideration of the structure of these wires is taken into account. Variations in these properties are chiefly due to variations in the amount of impurities and imperfections in the wires tested.

✦ ✦ ✦

FATIGUE values of hard drawn wires produced from copper powders are higher than those for hard drawn "OFHC" wires, despite the fact that in this case the tensile strength of "OFHC" wires could be reached only by wires produced from the coarsest powders. The order of the curves in the "S-N" diagram for wires as a function of the initial powder, is the same as is found in all other diagrams of the properties of wires.

✦ ✦ ✦

IN conclusion it may be said that in spite of the somewhat unusual working procedure applied to the sintered copper specimens of this investigation, the results obtained are of great significance.

✦ ✦ ✦

IT has been proved that a proper selection of the initial powder and an intelligent application of processing and working methods may yield metal wires of a structure and of properties commonly experienced with ordinary material.

✦ ✦ ✦

FURTHER on it has been found that a sinter metal of lower melting point than the refractory metals may be rendered just as suitable for cold working as the high melting metals. This in turn points the way for entirely new developments in the field of powder metallurgy.

ANNUAL WORCESTER REGIONAL MEETING

PUTNAM & THURSTON'S RESTAURANT, WORCESTER, MASS.,
THURSDAY, MAY 15, 1941 — DINNER AT 6:30 P. M.

Guest Speaker — Lt. Col. Scott B. Ritchie, Ordnance Dept., U. S. Army
Director of Laboratory, Watertown Arsenal, Watertown, Mass.

TOPIC: "GOVERNMENT INSPECTION OF MILITARY MATERIAL"

There will be a registration fee of $2.50 including the dinner preceding the technical meeting. Mail your reservation in today to

R. R. Tatnall, Chairman of the Meeting,
Wickwire Spencer Steel Company,
Worcester, Mass.

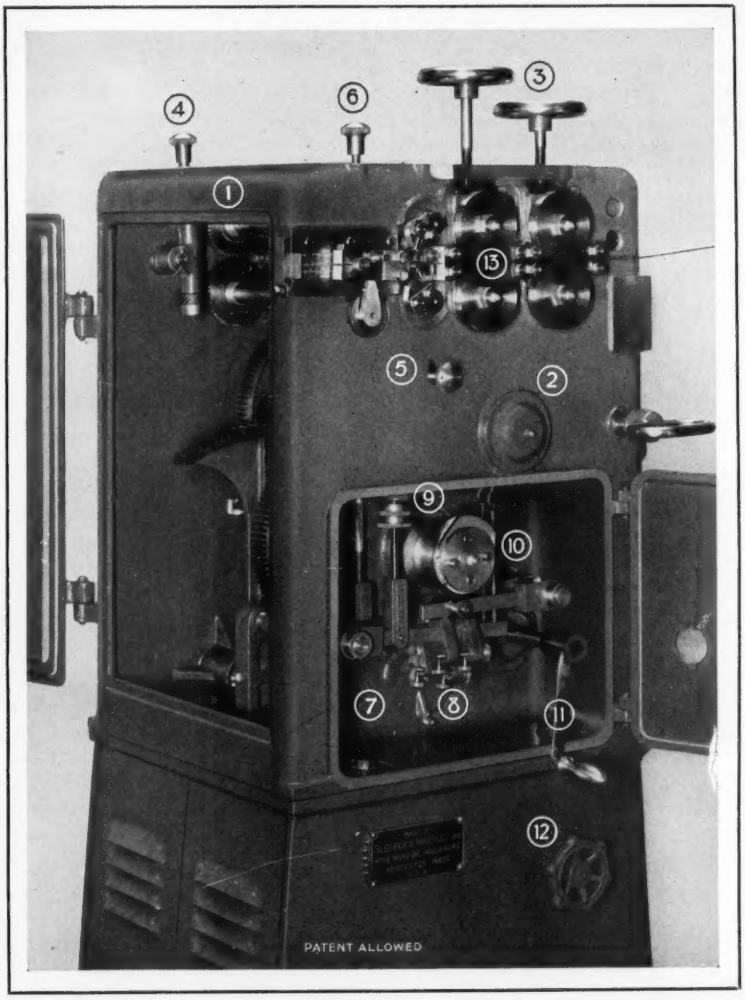
or

Richard E. Brown, Executive Secretary,
The Wire Association,
300 Main Street, Stamford, Conn.

13 Points of Superiority

in

No. 1 Universal Spring Coiler



1- One piece cast iron housing for rigidity and perfect alignment.

2- Ball Bearing construction throughout on all rotating shafts.

3- **Convenient Controls —** Individual pressure control for each pair feed rolls.

4- Individual simple adjustment for cutter alignment, easily adjusted from upper to lower cutter.

5- Pitch and

6- Diameter control readily accessible.

7- Pitch and Diameter Cam control located in recess in front housing.

8- Rapid and micrometer adjustment of compound blocks facilitates set-up time.

9- Pitch stop conveniently located and quickly adjusted.

10- Combination cam hub for pitch and diameter cams, completely removable from machine.

Both pitch and diameter cams may be shaped and timed on the cam hub for special springs and the entire unit removed from the machine, thus reducing set-up time. Additional cams and hubs can be applied for this purpose.

One piece solid cams can be used on this removable cam hub.

11- Removable ratchet-type crank for set-up purposes only. Removed during operation.

12- Motor or Pulley Drive as required with variable Speed Transmission for production range if desired.

13- Tooling interchangeable with previous Sleeper & Hartley models.

INCREASED CAPACITY

Compound gearing for 96″ feed if desired.

Other Improved Features—

Morse Free Wheeling Clutch for high-speed accuracy. Morse Free Wheeling Recoil Clutch, as extra equipment, if desired.

Single cutter operation.

Wear free diameter slide connection.

No. 1 Universal Spring Coiler

Segment Type

48″ Model *Series 666*

Wire Range .018″ to .080″

SLEEPER & HARTLEY, Incorporated

DESIGNERS AND BUILDERS

Worcester, Massachusetts, U. S. A.

Fatigue Tests On Zinc-Coated Steel Wire

By D. G. Watt,
Assistant Testing Engineer,
The Hydro-Electric Power Commission of Ontario, Toronto, Ont., Canada

SYNOPSIS

Reversed bending fatigue tests were made on zinc-coated steel wires of three strengths. In general, the endurance limit increased with the tensile strength while the endurance ratio diminished. Wire from the same reels tested in the lead-annealed and hot-dip galvanized conditions showed the deleterious effect of the coating process on the fatigue properties. No perceptible difference was observed between the endurance limits of wire from corresponding reels hot-galvanized with four and three-and-one-half dip coatings. Reduction by drawing within the range investigated, increased the fatigue resistance of the wires both in the lead-annealed and zinc-coated conditions. ✦ ✦ ✦

Hot-dip zinc coatings developed, under reversed stressing, closely spaced hair cracks perpendicular to and terminating at the surface of the steel. In electrodeposited zinc coatings no evidence of such cracks could be found after similar treatment. The results obtained on defective wires, containing surface seams or nonmetallic inclusions, demonstrated the utility of the fatigue test for detecting faulty material. No definite correlation could be observed between the data furnished by the ordinary bend and twist tests, as carried out at the mill, and the endurance limits of the wires.

THE progressive failure of overhead conductor cables due to aeolian vibrations presents a serious problem to engineers responsible for the design and maintenance of power-transmission lines. A great amount of study has been devoted to the cause and nature of conductor vibration and to the devising of mechanical dampers to suppress it below a harmless limit.

✦ ✦ ✦

COINCIDENT with the advances which have been made in restricting the intensity of cable vibration to the point where indefinitely long or at least extended conductor life will result, efforts have been made to obtain conductor materials with the best fatigue properties and to ensure that these properties are maintained during manufacture by checking from time to time the endurance limit of the wire from which the conductor is being fabricated.

✦ ✦ ✦

THE simple reversed bending fatigue test, while it does not duplicate the complex stress conditions to which the wires in a vibrating cable are subjected in the field, furnishes the most practical method of measuring the relative ability of materials to withstand vibration failure. For application of wire in overhead conductors, where aeolian vibrations may occur, the results of fatigue tests on the material have more significance than much of the data obtained from the standard or commonly prescribed wire-quality tests. Measurements of tensile strength, elastic limit, and ductility still constitute the basic requirements of the majority of wire specifications. In spite of the fact that such data are essential to the designer and in many instances are related to service life, it is common knowledge that the results fail to reveal whether the material has the required fatigue strength for applications in which vibratory stressing may occur.

Published by permission of the American Society for Testing Materials.

✦ ✦ ✦

THE work recorded in this paper represents a part of the Hydro-Electric Power Commission's researches on the fatigue properties of conductor materials, namely, that dealing with zinc-coated steel wire of the type from which transmission line ground wire cables are stranded.[2]

2 References are at the end of the paper.

✦ ✦ ✦

BRIEFLY, the objects of the investigation were as follows:

1. To compare the endurance limits of zinc-coated steel wires of the following grades:
   220,000 to 250,000 psi.
   170,000 to 190,000 psi.
   110,000 to 120,000 psi.
2. To determine the extent to which the hot-dip galvanizing process affects the endurance limit of steel wire in the lead-annealed condition.
3. To determine, within a specified range, the influence of the thickness of zinc coating on the endurance limit.
4. To determine whether the results of the ordinary quality tests, as carried out at the mill, namely, tensile strength, percentage elongation, bends and twists to failure, give any indication of the fatigue properties of the wire.
5. To supplement physical tests by microscopic examinations of the wires and their coatings to determine, where possible, the factors which are deleterious to the fatigue properties of the material.

✦ ✦ ✦

Materials

THE investigation was carried out on wires classified on the basis of tensile strength in Table I. The tabulated data include the condition in which the wire was tested, the chemical composition, diameter, and weight of zinc coating. The key to the sample numbering system is explained in Fig. 1.

✦ ✦ ✦

ALL coils of 170,000 to 190,000 psi. grade wire in group B were drawn from the same melt

of steel. Samples were obtained from four reels of wire diameters 0.080, 0.101, and 0.117 in. Part of each reel was withdrawn from the continuous process after lead-bath annealing. The remainder was subjected to the complete coating process, including lead-bath annealing, pickling, and hot-dip galvanizing.

✦ ✦ ✦

THE 220,000 to 250,000 psi. grade wires in group A were drawn from two melts of steel, the one of lower carbon content being used for the 0.082-in. diameter wire. The sample coils were obtained from two reels of each diameter. As in the case of the wires in group B, a portion of each reel was lead-annealed and the remainder hot-dip galvanized.

✦ ✦ ✦

ALL of the wires in group D and part of the wires in groups E, F, and G were zinc coated by electrolytic processes.

✦ ✦ ✦

Test Methods

THE fatigue data presented in this paper were obtained from tests carried out on two Haigh-Robertson wire fatigue testing machines, one of which is shown in Fig. 2. Since these testing machines, or slight modifications, are in general use and have been described in detail elsewhere, it is only necessary to outline briefly the principle of operation here.[3]

✦ ✦ ✦

IN Fig. 2 it will be observed that one end of the wire specimen under test is gripped in the chuck on the motor shaft. The other, fitted with a small cup - faced sleeve, runs on a ball thrust bearing mounted in a movable tailstock on the bed of the machine. The headstock, including the driving motor and chuck, is free to turn on a vertical axis coincident with the chuck jaws. By means

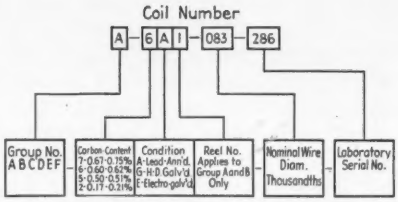


Fig. 1. Key to Coil Numbering System. ✦

of a fine screw adjustment, the thrust bearing on the tailstock may be moved towards the headstock and the wire specimen thus given any desired degree of deflection as a strut and simultaneously rotated by the motor about the neutral axis.

✦ ✦ ✦

IF the modulus of elasticity of the wire is known, the maximum stress in the specimen, which occurs at mid-length, may be calculated from its length-diameter ratio and the angle of inclination at the free ends. This angle is read directly from the vernier angular scale attached to the swinging headstock. In the case of the zinc-coated wires the length-diameter ratio was based on the diameter of the steel. The principle of load measurement employed in the Haigh-Robertson machine assumes that the wire specimen was originally straight. If this requirement is not fulfilled and the wire contains any small kinks, twists of long radius bends, secondary vibrations will be set up in the rotating specimen and it will not conform to the smooth curve on which the stress calculations are based.

✦ ✦ ✦

THE wire samples, as received, contained the natural curvature of the coil produced by winding on the take-ups in the galvanizing plant. Straightening of the specimens was first carried out by pulling each in a testing machine to the so-called yield point determined by the drop of the beam. This method, which was originally suggested by the makers of the Haigh-Robertson machine, proved fairly satisfactory for 170,000 to 190,000 psi. grade wire, although at times supplementary hand straightening was required.[4] In the case of the harder wires it was found that straight specimens could be obtained more conveniently by passing the wire through a small hand-operated straightening machine. Accordingly, after all the tests had been completed on groups A, B, and D, the remaining tests were carried out on machine-straightened specimens.

✦ ✦ ✦

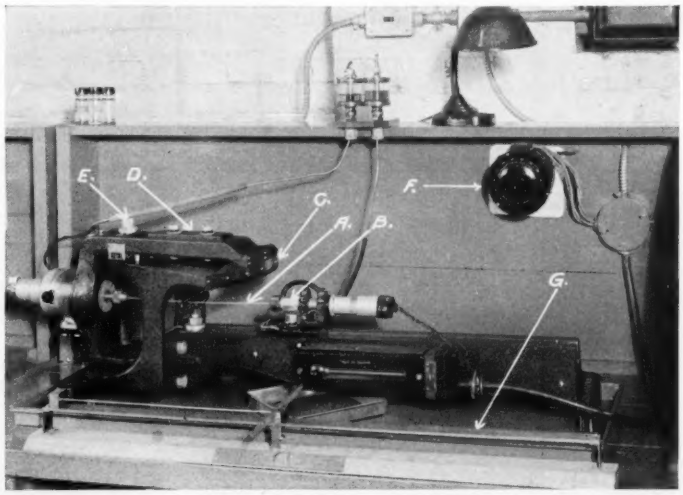
THE testing speed used was of the order of 6000 to 7000 rpm. In some of the tests higher and lower speeds were employed to eliminate specimen vibration.

✦ ✦ ✦

MODULUS of elasticity determinations were carried out on at least two wire specimens from each coil, strain measurements being recorded over a 10-in. gage length with an Anderson extensometer.[5] The samples for modulus of elasticity tests were straightened by the same methods as those employed for straightening the fatigue specimens.

✦ ✦ ✦

BEND and twist tests were performed in the hand-operated machines, supplied by the W. & T. Avery Co.



A—Wire specimen.
B—Tailstock.
C—Angular scale.
D—Headstock.
E—Vertical headstock bearing.
F—Speed control.
G—Specimen length gage.

Fig. 2. Haigh-Robertson Fatigue Testing Machine. ✦ ✦ ✦

Test Data

A SUMMARY of the test data obtained on each sample coil of wire is presented in Table I. The information includes values for tensile strength, percentage elongation, twists and bends to failure, modulus of elasticity, endurance limit, and endurance ratio, that is, the ratio of endurance limit to tensile strength.

✦ ✦ ✦

TYPICAL S-N curves on wires of different diameters from groups B and A, in the lead-annealed and hot-dip galvanized conditions, are shown in Figs. 3 and 4. It will be observed that on some of the curves there was a range of stress, varying from 1000 to 3000 psi. above the endurance limit, in which a number of the specimens broke at less than 10,000,000 cycles, while others, tested at the same stress, continued to run unbroken over the 10,000,000 cycle mark. It is thought that in this critical stress range, where the S-N curve is approaching the horizontal, a given degree of nonuniformity in the fatigue resistance of the specimens, such as that due to minute differences in surface condition, results in a greater variation in cycles to failure than at the higher stresses where the slope of the curve is steeper.

✦ ✦ ✦

TO facilitate ready comparison, the endurance limits of the wires are plotted in Fig. 5. Horizontal lines have been inserted to represent the average of the test values obtained on sample coils of wire having the same diameter, similarly processed and made from the same melt of steel.

✦ ✦ ✦

A COMPARISON of the results obtained on the lead-annealed

TABLE I.—SUMMARY OF TEST DATA

Grade	Coil Number	Wire Diameter, in. (Steel)	Composition, per cent				Condition	Weight of Zinc Coating, oz. per sq. ft.	Tensile Strength, psi.	Elongation in 10 in., per cent	Twists to Failure, Length = 100 D		Bends to Failure, 180 deg., r = 0.187 in.		Modulus of Elasticity, psi	Endurance Limit, psi.	Endurance Ratio, per cent
			Carbon	Manganese	Phosphorus	Sulfur					Number	Average Variation, per cent	Number	Average Variation, per cent			
220,000 to 250,000 psi	A-6A1-083-286	0.082	0.60	0.98	0.028	0.028	Lead-annealed	.....	232 500	5.1	26.4	3.0	17.0	0.0	28 800 000	73 200	31.4
	A-6A2-083-272	0.082							229 000	5.0	30.5	1.5	17.0	0.0	29 200 000	73 000	31.8
	A-7A1-104-276	0.103	0.75	1.10	0.029	0.030	Lead-annealed	.....	258 200	5.1	24.1	1.0	10.8	2.8	29 000 000	71 500	27.6
	A-7A2-104-280	0.103							255 800	5.0	27.4	1.0	8.8	3.4	28 700 000	73 800	28.9
	A-7A1-125-282	0.123							227 000	5.4	27.4	1.0	11.6	3.4	27 800 000	65 000	28.6
	A-7A2-125-284	0.123							225 800	5.3	27.2	1.0	8.8	4.2	28 000 000	67 200	29.8
	A-6G1-083-287	0.082	0.60	0.98	0.028	0.028	Hot-dip galvanized	0.087	227 000	5.3	26.5	2.0	13.4	3.7	28 700 000	58 200	25.6
	A-6G2-083-273	0.082						0.088	226 500	5.2	23.8	3.0	11.8	2.5	28 700 000	58 500	25.8
	A-7G1-104-277	0.103	0.75	1.10	0.029	0.030	Hot-dip galvanized	0.95	248 000	5.6	23.1	3.0	11.0	0.0	28 900 000	60 500	24.4
	A-7G2-104-281	1.103						0.92	248 000	5.7	23.1	1.0	9.0	0.0	28 800 000	60 500	24.4
	A-7G1-125-283	0.123						1.05	223 000	5.5	27.6	3.0	7.0	0.0	29 200 000	54 200	24.3
	A-7G2-125-285	0.123						1.01	224 000	5.5	28.2	1.0	9.0	0.0	28 400 000	54 100	24.2
	C-7E -083 200	0.080	0.73	0.67	.....	.....	Electrogalvanized	0.92	255 800	5.2	26.2	15.0	16.0	0.0	28 900 000	72 700	28.4
	C-7E -104-201	0.101	0.74	0.63	.....	.....	Electrogalvanized	0.94	240 100	5.4	26.2	13.0	11.0	0.0	28 500 000	66 400	27.6
	C-7G -104-202	0.101	0.74	0.71	.....	.....	Hot-dip galvanized	1.08	230 100	5.2	12.8	43.0	9.3	4.3	29 100 000	57 100	24.7
	C-7E -125-203	0.122	0.67	0.72	.....	.....	Electrogalvanized	0.90	234 900	5.3	17.0	27.0	7.0	0.0	28 500 000	58 600	24.9
170,000 to 190,000 psi	B-5A1-083-236	0.080	0.50	1.06	0.025	0.023	Lead-annealed	.....	181 000	6.4	37.9	1.7	17.0	0.0	29 500 000	69 500	38.4
	B-5A2-083-241	0.080							183 000	6.9	35.3	3.4	17.4	2.9	29 400 000	73 000	39.9
	B-5A3-083-246	0.080							187 700	6.0	36.0	0.0	19.0	0.0	29 600 000	69 000	36.8
	B-5A4-083-251	0.080							186 200	6.0	34.9	2.3	19.2	1.6	29 500 000	74 100	39.8
	B-5A1-104-200	0.101							170 200	6.9	33.4	4.1	13.1	0.0	29 600 000	67 200	39.4
	B-5A2-104-224	0.101							175 800	6.9	31.5	3.5	13.4	3.7	29 200 000	65 700	37.4
	B-5A3-104-228	0.101							178 800	7.0	35.0	6.3	14.0	0.0	29 000 000	64 500	36.1
	B-5A4-104-232	0.101							172 800	7.3	33.4	6.9	11.8	2.5	29 000 000	66 000	38.2
	B-5A1-125-204	0.117							171 200	6.6	30.0	1.3	11.0	0.0	28 500 000	61 400	35.8
	B-5A2-125-208	0.117							176 100	6.4	30.4	1.6	11.8	2.5	28 700 000	61 100	34.6
	B-5A3-125-212	0.117							177 100	6.4	31.0	0.0	9.0	0.0	28 200 000	62 600	35.3
	B-5A4-125-216	0.117							178 000	6.6	33.0	0.0	11.0	0.0	28 700 000	65 100	36.6
	B-5G1-083-238	0.080	0.50	1.06	0.025	0.022	Hot-dip galvanized	0.88	179 200	6.1	23.8	3.2	11.2	2.7	29 800 000	50 800	28.4
	B-5G2-083-243	0.080						0.89	181 200	6.0	23.5	2.2	15.0	0.0	29 500 000	52 500	29.0
	B-5G3-083-248	0.080						0.85	182 000	6.0	23.2	1.4	12.2	2.4	29 600 000	52 600	28.9
	B-5G4-083-253	0.080						0.90	182 800	6.1	22.9	2.8	15.0	0.0	29 200 000	53 000	29.0
	B-5G1-104 222	0.101						0.93	170 400	6.5	22.0	0.0	11.0	0.0	29 300 000	50 900	29.8
	B-5G2-104-226	0.10'						1.15	168 000	6.6	21.6	2.2	11.2	2.7	29 200 000	47 500	28.3
	B-5G3-104-230	0.101						0.91	175 400	7.3	22.4	2.1	13.0	0.0	29 200 000	51 000	29.0
	B-5G4-104 234	0.101						0.94	170 000	7.1	22.4	2.2	11.0	0.0	29 000 000	48 500	28.6
	B-5G1-125 206	0.117						0.96	176 100	6.3	29.2	1.1	11.0	0.0	28 300 000	48 500	27.5
	B-5G2-125 210	0.117						0.81	178 000	6.5	29.2	1.1	11.0	0.0	28 600 000	48 300	27.1
	B-5G3-125-214	0.117						0.98	176 000	6.2	30.2	3.2	9.0	0.0	28 200 000	46 000	26.1
	B-5G4-125-218	0.117						0.90	178 100	6.0	27.2	1.2	9.0	0.0	28 300 000	48 000	26.9
	D-5E -104 259	0.100	0.51	1.07	0.014	0.024	Electrogalvanized	0.90	189 800	7.2	29.5	1.7	11.0	0.0	28 700 000	56 200	29.6
	D-5E -104-260	0.098						2.03	191 400	7.3	29.6	1.6	10.8	2.7	29 600 000	60 500	31.6
	D-5E -104-261	0.095						2.30	189 700	7.4	27.6	2.4	9.0	0.0	29 000 000	58 500	30.8
	E-6E -083-221	0.080	0.61	0.78	.....	.....	Electrogalvanized	1.05	189 500	6.3	30.6	9.0	8.3	7.2	28 500 000	65 000	34.3
	E-6E -104-223	0.101	0.62	0.87	.....	.....	Electrogalvanized	0.87	171 700	7.8	31.0	5.5	8.0	0.0	28 400 000	62 000	36.1
	E-6G -104-225	0.101	0.60	0.81	.....	.....	Hot-dip galvanized	1.10	175 000	7.2	17.0	7.5	7.8	3.9	28 500 000	54 800	31.3
	E-6E -125-227	0.122	0.61	0.92	.....	.....	Electrogalvanized	1.03	171 300	7.5	28.0	5.5	6.0	0.0	29 000 000	58 300	34.0
110,000 to 120,000 psi	F-2E -083-263	0.080	0.21	0.46	.....	.....	Electrogalvanized	0.95	118 000	6.4	34.7	9.8	18.0	6.6	28 400 000	50 600	42.9
	F-2E -104-264	0.101	0.19	0.42	.....	.....	Electrogalvanized	1.05	116 500	8.5	35.5	1.5	10.0	0.0	29 100 000	47 900	41.1
	F-2G -104-265	0.101	0.17	0.50	.....	.....	Hot-dip galvanized	1.01	112 800	8.2	19.8	3.0	8.9	2.2	28 600 000	43 100	38.2
	F-2E -125-266	0.122	0.20	0.49	.....	.....	Electrogalvanized	0.94	110 100	7.8	17.4	3.0	8.5	7.0	29 200 000	45 500	41.3

and hot-dip galvanized wires in groups A and B reveals the deleterious effect of the hot-dip galvanizing process on the endurance limits of the uncoated steel wires. Galvanizing depressed the endurance limits of the lead-annealed wires 11,000 to 20,000 psi., the adverse effect of the coating being somewhat less for the wires in group A than for those in group B.

✦ ✦ ✦

IN Fig. 6 the endurance limits of all of the hot-dip galvanized wires are plotted against their respective ultimate strengths. Although there is a considerable scatter in the points due to differences in chemical composition, reduction by drawing and processing treatments, the results indicate that the 220,000 to 250,000 psi. grade wires have somewhat higher endurance limits than the 170,000 to 190,000 psi. grade. The endurance limit of the one coil of 110,000 to 120,000 psi. grade was lower than those of the two harder grades. The improvement in the fatigue properties of the wires as the tensile strength increased was accompanied by a loss in ductility as revealed by a smaller percentage elongation at failure in the tension test.

✦ ✦ ✦

THE plot of the endurance ratios of all of the hot-dip galvanized wires against their respective tensile strengths, in Fig. 6, shows that this ratio becomes smaller as the tensile strength of the wire is increased. Reference to the data obtained on the lead-annealed and the electro-galvanized wires in Table I reveals a similar relationship between the endurance ratio and the tensile strength for wire in these conditions.

✦ ✦ ✦

THE effect of drawing on the endurance limit of the zinc-coated wires is illustrated by Fig. 7, in which the endurance limits of the wires, from each sample group, are plotted against the wire diameter. It will be observed that in every case some improvement was effected in the endurance limit as the reduction by drawing was increased. The break in the curve for the samples from group A is due to the use of a lower carbon steel for the 0.082-in. diameter wire than for the two larger sizes. A similar effect may be noted between the endurance limits of the lead-annealed wires of various diameters.

✦ ✦ ✦

IT will be observed from the data in Table I that wires coated by electrolytic processes had endurance ratios slightly exceeding those obtained on the hot-dip galvanized wires of similar grade. Although variations in chemical composition, drawing, and heat treatment of the base wires may preclude a direct comparison being drawn between the relative effect of the two coatings, the results point to the superiority of the electrodeposited coatings over those applied by the hot-dip method, in so far as the fatigue resistance of the finished wires is concerned.

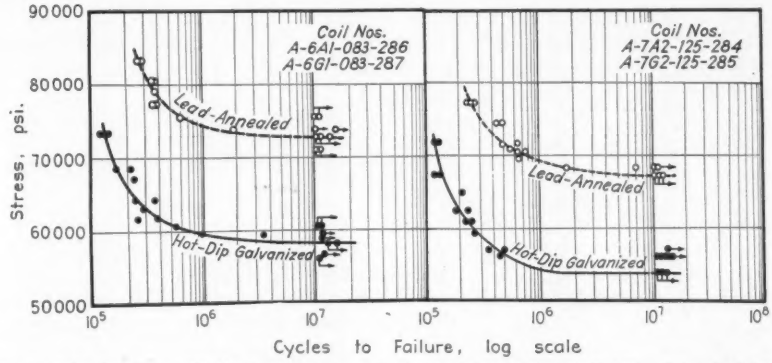


Fig. 3. S-N Curves on 170,000 to 190,000 psi. Grade Lead-Annealed and Hot-Dip Galvanized Wire.

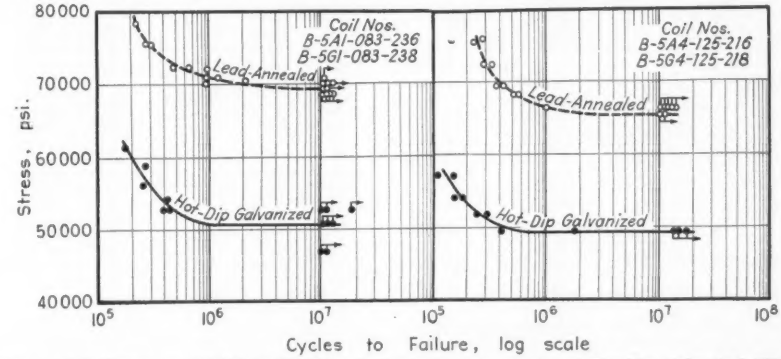


Fig. 4. S-N Curves on 220,000 to 250,000 psi. Grade Lead-Annealed and Hop-Dip Galvanized Wire.

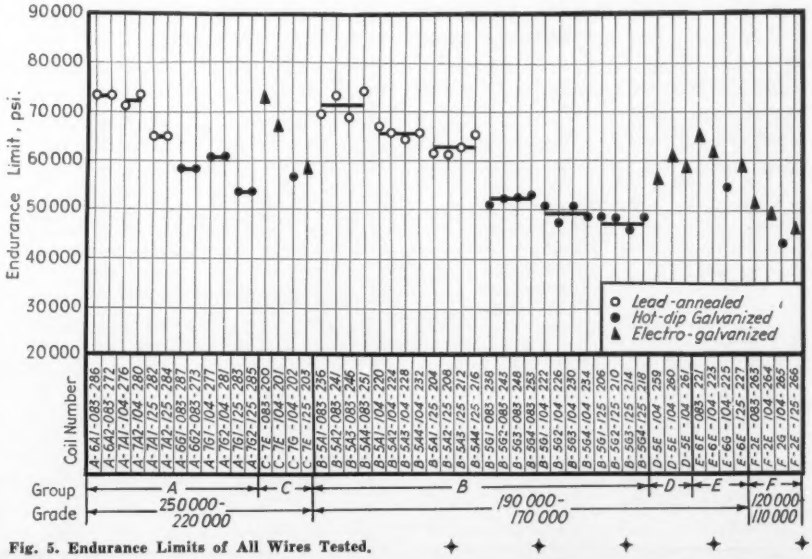


Fig. 5. Endurance Limits of All Wires Tested.

✦ ✦ ✦ ✦ ✦

A NUMBER of tests were made to determine the effect of coating thickness on the endurance limit of hot-dip galvanized wire. Two coating thicknesses were employed, namely, those required to withstand four and three-and-one-half dips, respectively, in the Preece test. The samples were obtained by applying the coatings to wire from corresponding reels. The results of the tests, presented in Table II, indicate that within the range investigated coating thickness had no perceptible effect on the endurance limit of the wire.

✦ ✦ ✦

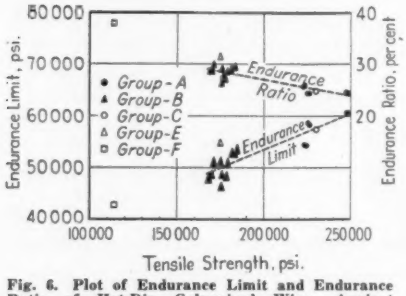


Fig. 6. Plot of Endurance Limit and Endurance Ratio of Hot-Dip Galvanized Wires Against Ultimate Strength.

✦ ✦ ✦

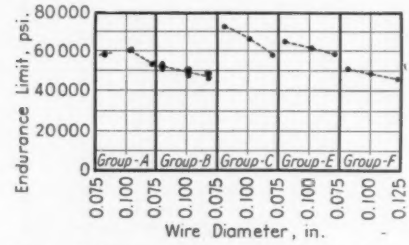


Fig. 7. Endurance Limits of Zinc-Coated Wires from Each Group Plotted Against Wire Diameter.

THE average number of twists and bends to failure, along with the percentage average variation in the results obtained on the specimens from each coil, are shown in Table I. Plots of twists and bends to failure against the endurance limits of the wires revealed no definite correlation between these values.

Discussion of Test Results

SEVERAL investigators have drawn attention to the detrimental effect of the hot-dip galvanizing process on the endurance limit of steel wire. In many of these researches, however, the comparison has been made between the endurance limit of the galvanized wire and that of the same wire chemically stripped of its coating or machined and polished to a smooth steel surface.[6, 4]

✦ ✦ ✦

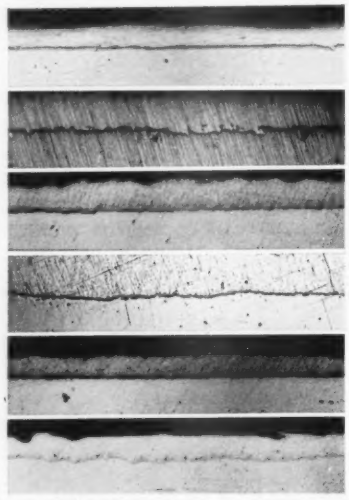


Fig. 8. Contour of Parting Line Between Coating and Steel.

✦ ✦ ✦ ✦

THE injurious influence of the hot-galvanizing process on the fatigue properties of steel wire has been attributed both to surface notching caused by the etching action of the pickling solution and hot zinc on the wire surface and to the presence of the hard brittle zinc-iron alloy layers adjacent to the steel. Chemical stripping of the coated wire may remove the alloy layers, but it does not restore the surface of the steel to the condition prior to galvanizing. Similarly, when the coated wires are machined to the steel and polished, the surface condition is entirely changed and the endurance limit will probably exceed that of the wire before subjection to the coating process. A truer measure of the effect of the hot-galvanizing process on the fatigue properties of wire than is given by either of the above methods is to test the material before and after galvanizing as was done in this investigation.

✦ ✦ ✦

THE micrographs in Fig. 8 illustrating the surface condition of the steel in the zinc-coated wires, reveal the irregularities or notches that have always been associated with the relatively low endurance limits of these materials.

✦ ✦ ✦

TO investigate the influence of cyclic reversed stressing on the zinc coatings, microscopic examinations were made of longitudinal sections before and after subjection to 10,000,000 cycles of reversed stress at the endurance limit. The micrographs in Fig. 9 show that the hot-dip coatings during this treatment developed closely spaced hair cracks perpendicular to and terminating at the steel surface. Similar cracks could not be found in the electrodeposited coatings on specimens subjected to the same treatment. The absence of hair cracks in the electrogalvanized coatings after reversed stressing and the consequent elimination of a source of stress concentration which was active in the hot-dip coatings, may help to explain the higher endurance ratios obtained on the wires coated by the former process. Closely spaced hair cracks, of the type referred to above, could not be detected in the coating on specimens straightened in a tension testing machine, an observation which precluded the possibility that these cracks were produced in the straightening process.

✦ ✦ ✦

MACROSCOPIC examination of the surface of the hot-dip

TABLE II.—EFFECT OF COATING THICKNESS ON ENDURANCE LIMIT.

Coil Number	Weight of Zinc Coating, oz. per sq. ft.	Endurance Limit, psi.		Endurance Ratio, per cent	
		4 Dip Coating	3½ Dip Coating	4 Dip Coating	3½ Dip Coating
B-5G1-083-238	0.88	50 800	.....	28.4	...
B-5G1-083-239	0.68	.....	52 500	...	29.6
B-5G2-083-243	0.89	.....	.....	29.0	...
B-5G2-083-244	0.67	52 500	52 200	...	28.8
B-5G3-083-248	0.85	.....	.....	28.9	...
B-5G3-083-249	0.69	55 600	53 300	...	28.6
B-5G4-083-253	0.90	.....	.....	29.0	...
B-5G4-083-254	0.70	53 000	52 500	...	28.7

coated fatigue specimens, after test, revealed the presence of circumferential corrugations or stress lines near the mid-span where the highest reversed bending stresses prevailed. Near the free ends of the specimens, where the stresses were relatively low, the appearance of the coated surface remained unchanged after test.

✦ ✦ ✦

HOT-DIP galvanizing depressed the endurance limits of the 170,000 to 190,000 psi. grade lead-annealed wires by 21 to 28.4 per cent. The corresponding reduction for the 220,000 to 250,000 psi. grade wire varied from 15.4 to 20.5 per cent. It might have been expected from the relative ductilities of the two materials that the endurance limits of the harder wires would have suffered the greater reduction in the galvanizing process. For the present the difference in the relative effect of the hot-dip coatings on the endurance limits of the two grades of wire remains unexplained.

✦ ✦ ✦

FROM results obtained by other investigators in fatigue tests on steel wire, it may be shown that an increase in the tensile strength or carbon content of the material is generally accompanied by a decrease in the endurance ratio.[7, 8] The data presented here demonstrated that a similar relationship exists between the endurance limits of zinc-coated steel wires of various strengths, regardless of the method by which the coating is applied. The effect of the tensile strength or the carbon content of the wire on the endurance ratio has been partially attributed, by some authorities, to surface decarburization.[9] Traces of this condition were found in some of the sample groups but it was not common to all of the wires tested.

✦ ✦ ✦

THE utility of the fatigue test for detecting surface flaws on wire is illustrated by the results obtained on the lead-annealed coil No. B-5A1-125-204. The test values, plotted in Fig. 10, fall into two groups. Through one of these an S-N curve was drawn which agreed closely with those obtained on three coils of wire of a corresponding grade and diameter and drawn from the same melt of steel. The second group roughly defined a curve located considerably below the aforementioned one, all of the points on which indicated failure at less than 2,600,000 cycles of reversed stress. Subsequent examination of the specimens revealed that all of those which gave low and erratic values in the test contained one or more longitudinal surface seams similar to that illustrated in Fig. 10. The specimens which defined the normal fatigue curve showed no evidence of this condition. Visual examination of the coil from which the above specimens were obtained revealed that surface seams occurred intermittently along a considerable portion of its length.

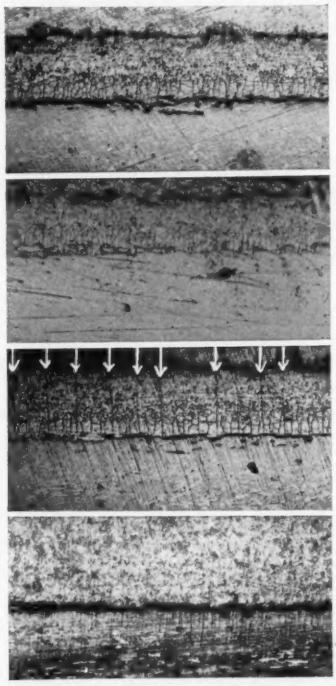


Fig. 9. Hair Cracks Developed in Hot-Dip Coatings after Fatigue Stressing. ✦ ✦

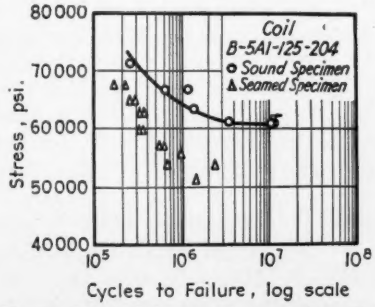
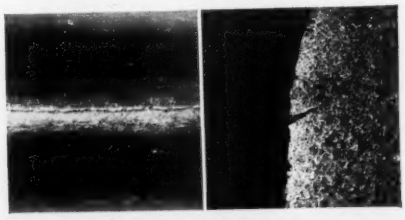


Fig. 10. Effect of Surface Flaw on Fatigue Test Results. ✦ ✦ ✦ ✦



Seam in Wire

✦ ✦ ✦

A FEW of the fatigue specimens broke with a split type of fracture. Microscopic study of these fractures invariably revealed the presence of elongated nonmetallic inclusions located near the shoulder of the break. A micrograph illustrating the condition in the vicinity of such a fracture is shown in Fig. 11. In this particular specimen a fatigue crack, in the process of development, was detected about ¼ in. from the point where failure occurred.

✦ ✦ ✦

ALTHOUGH the twist and bend test results could not be directly correlated with the endurance limits of the wires, the tests proved useful in that they furnished a convenient method of assessing the uniformity of material and detecting brittleness therein. The twist test results appeared to be strongly influenced by the surface condition and ductility of the outer fibers of the wire. Hot-galvanizing, in general, depressed the twists and bends to failure obtained on the lead-annealed wire, the effect being more marked in the wires in group B than in the harder wires in group A.

(*Please turn to Page 294*)

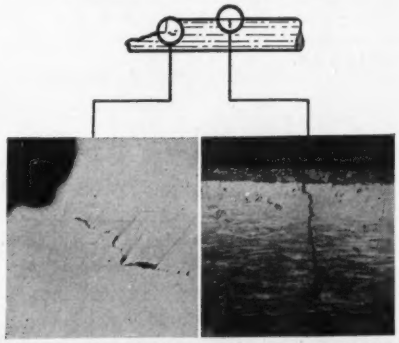


Fig. 11. Nonmetallic Inclusion Located at Split Fatigue Fracture and a Second Fatigue Crack in the Process of Development. ✦ ✦

"Military Inspection of Materials" Features Pittsburgh Wire Association Meeting

By Richard E. Brown,
Executive Secretary, The Wire Association

THE Pittsburgh Regional meeting of the Wire Association was held at the Wm. Penn Hotel, Pittsburgh, Pennsylvania, on April 17th. During the day Wire Association Headquarters were open all day in the hotel with Major Richard E. Brown, Executive Secretary, and Mrs. R. S. Spengel, assistant in charge.

✦ ✦ ✦

THE dinner at 6:30 P. M. was attended by 122 members and friends with several more attending for the talks and discussion.

✦ ✦ ✦

AT the dinner a telegram received from **Frederick A. Westphal,** Past President of the Association, was read and follows herewith:

April 17, 1941

"Major Richard E. Brown,
Executive Secretary,
The Wire Association,
c/o William Penn Hotel,
Pittsburgh, Penna.

Four years ago the Wire Association led all technical societies by advocating Industrial Mobilization. Three years ago Assistant Secretary of War, Louis Johnson, gave his kick off address advocating preparedness for M Day and Industrial Mobilization to the Wire Association in Detroit. One year ago at Pittsburgh the Wire Association hurled the challenge "America must be ready." Today we are a long way from achieving the goal to meet aggressor nations. Let us all hit the line hard, don't foul and don't shirk, but hit the line hard for America to be ready to defend her ideals and principles. Your Past President deeply regrets he cannot be present with you and herewith are my deepest regards, respects and affection to you all.

Frederick A. Westphal."

✦ ✦ ✦

Lest We Forget

LEST we forget and for the information of the newer members of the Wire Association, our activities in Industrial Mobilization started in 1932 under authority of a letter from **F. H. Payne,** then Assistant Secretary of War, requesting the Wire Association to cooperate with the Signal Corps of the Army in a Survey of the wire industry.

✦ ✦ ✦

THE Association satisfactorily concluded this effort for the Army and since that time has been working in very close cooperation with the Signal Corps on various questions relating to wire production, processes and manufacturing facilities.

✦ ✦ ✦

AS Mr. Westphal brings out in his telegram, the then Assistant Secretary of War **Louis Johnson** presented his initial **Industrial Mobilization** address before the Wire Association Convention in Detroit and from that point of origination the **Industrial Mobilization** idea has gained constant momentum until it occupies the position in the public eye we now know.

✦ ✦ ✦

CURIOUSLY enough the newspaper men who were invited to listen to that address by **Colonel Johnson** completely ignored the importance of the **Industrial Mobilization** theme and in the newspaper accounts of the meeting at that time paid no attention to this side of his address but did pay a lot of attention to the political side of it or rather what they thought was the political side of it.

✦ ✦ ✦

FOLLOWING the meeting at which **Colonel Johnson** broke the ice on Industrial Mobilization, **Major General J. O. Mauborgne,** Chief Signal officer of the Army, in 1939, was guest speaker at the Annual Meeting in Cleveland and it is not necessary to bring to mind the interesting information which he presented to us and the profound effect it has had on some of our production activities.

✦ ✦ ✦

AGAIN on May 17th, 1940 **Mr. F. A. Westphal,** past president of the Wire Association delivered an address before the Pittsburgh Regional Meeting entitled, "America Must Be Ready." It is interesting to note that Mr. Westphal's address was devoted primarily to the subject of industrial preparedness and set forth a program at that time and before the government officially advocated industrial preparedness which since then has been substantially followed in the general plans for national defense.

✦ ✦ ✦

FROM this record it will be readily seen that our **Wire Association** has been far-seeing and in advance of others in an effort to create interest in problems in connection with National Defense.

✦ ✦ ✦

FOR the ability to do this the Wire Association is indebted not only to its own members operating within the Association but to **Major Frank W. Bullock,** now Assistant Director of Purchases, Office of the Assistant Secretary of War, who is our Army charter member and who has cooperated in every way through the years with the Association in its efforts to help build National Defense.

✦ ✦ ✦

Addresses and Discussions

LT. COL. S. B. RITCHIE, O. D., Watertown Arsenal, Watertown, Massachusetts, the guest dinner speaker, was introduced by the President of the Wire Association. J. K. Beeson, vice president, Pittsburgh Steel Co., with a few well chosen remarks, stressing the obligation of all citizens in the present emergency.

✦ ✦ ✦

COL. RITCHIE'S subject was, **"Inspection of Ordnance Materials."** His talk was very enlightening on the organization of

the inspection departments or divisions, and the training of men for inspectors. He also stressed the necessity of careful and rigid inspection on certain types of material and the correlation of inspection rigidity with importance of materials. The methods of setting specifications and the relationship to inspection procedures was also given prominence in his discussion.

✦ ✦ ✦

SUBSEQUENT to the dinner talk of **Col. Ritchie, Major Frank W. Bullock,** Assistant Director of Purchases of the executive office of the Assistant Secretary of War presented a short discussion on Government contracts, the method of securing them and the obligations involved in fulfillment.

✦ ✦ ✦

THESE two presentations, relating directly to the National Defense Program, were then opened for discussion in which many of those present participated. **Lt. Col. Guion,** Chief of the Pittsburgh District Ordnance office, ably assisted in the answering of questions. All in attendance deeply appreciated the information obtained and felt they had a better understanding of the problems of obtaining and fulfilling of defense orders.

✦ ✦ ✦

FOLLOWING these talks and discussions, an innovation was introduced in that no further papers were read but the meeting was opened for a general discussion of the subject of **"Cold Heading."** A very lively discussion ensued with the producers of cold heading stock generally stating the difficulties in production of material of satisfactory quality to meet the rigid requirements of present cold heading production.

✦ ✦ ✦

"LEST WE FORGET"

WAR DEPARTMENT

OFFICE OF THE ASSISTANT SECRETARY

WASHINGTON, D. C.

June 23, 1932.

Mr. R. E. Brown, Secretary,
The Wire Association,
551 Fifth Avenue,
New York, New York.

Dear Sir:

I desire to avail myself of this opportunity to express through you to the officers and members of The Wire Association my sincere appreciation of your patriotic offer to cooperate with the War Department in its work of planning for the mobilization of industry for the production of wire products for the Army and Navy in an emergency.

Your assistance will be an invaluable contribution to industrial preparedness, and it is with pleasure that I accept on behalf of the War Department the services of The Wire Association.

Very truly yours,

F. H. Payne

F. H. PAYNE,
The Assistant Secretary of War.

THE cold heading men reciprocated with their side of the question and explained why many of the extreme upsets and intricate shapes now being made had been transferred from screw machines to upsetters. These changes which have resulted in cost reductions have been passed to the ultimate consumer and the excess cost of production left as a hardship for the original producer.

✦ ✦ ✦

SOME of the cold heading men expressed themselves as of the opinion that in instances, changes could be made on the headers, which would materially aid the rod or wire manufacturer. However, it was the general consensus of opinion that surface defects such as seams or laps cannot be removed and they become accentuated in the final upset of the material. Such a condition can be helped by heat treatment, but remains as a possible source of ultimate rejection.

✦ ✦ ✦

A SUGGESTION was also made that header conversion costs have in some cases been reduced by the use of processed wire to a point more than compensating for the increased cost of the wire. It was also considered that ridgidity of inspection by the ultimate consumer was many times apparently excessive. This referred primarily to small head cracks. It was stated that the flaw causing such a crack could be present to the same extent in a machine screw product and not be noticed, yet the efficiency of the product would be satisfactory.

(*Please turn to page 309*)

THE WIRE ASSOCIATION

WHAT IT GIVES YOU FOR $10.00 ANNUAL DUES

I. WIRE & WIRE PRODUCTS — For One Year.

The official publication of The Wire Association, covering the Wire Industry; its Metallurgy, Technology, Research, Processes, Machinery and Personnel.

Regular Subscription — $5.00 in U. S.
$7.50 Foreign.

II. THE ANNUAL BUYERS GUIDE AND YEAR BOOK OF THE WIRE ASSOCIATION.

A complete Directory of the Wire Industry, with alphabetical listings of its Products, Machinery and Raw Materials. Gives the source of all Supplies and Equipment used in both the Manufacture of Wire and Rod, and Wire Products produced therefrom.

The Year Book Section contains: Constitution and By-laws of The Wire Association; Details of year's meetings, etc; List of Members, Index to Papers and Articles in WIRE AND WIRE PRODUCTS.

Regular Sales Price — $5.00.

III. QUESTION AND ANSWER SERVICE.

This extremely valuable service to members answers Technical and Operating Problems both in WIRE AND WIRE PRODUCTS, and direct by mail if desired. Available to members without charge.

IV. ANNUAL CONVENTION AND EXHIBITION.

(In Association with American Society for Metals and The National Metal Congress.) Technical Sessions, Plant Inspections.

V. REGIONAL MEETINGS.

Attendance at the Pittsburgh, Pa., and Worcester, Mass. meetings which include Local Plant Inspections, Technical Sessions and Discussions.

VI. PERSONAL CONTACTS.

Both at Annual and Regional Meetings, and throughout the year, for interchange of helpful information.

VII. INFORMATION SERVICE ON MACHINERY, EQUIPMENT AND SUPPLIES.

The Technical, Catalogue and Correspondence Files of the Wire Association hold the answer to practically every "Where can I buy" problem. This service is available to members without charge.

For Detailed Information Address

RICHARD E. BROWN,
EXECUTIVE SECRETARY

STAMFORD TRUST CO. BUILDING STAMFORD, CONN.

Outstanding Personalities of the Wire Industry

J. K. BEESON, Vice President — Sales Pittsburgh Steel Company President, The Wire Association

J. K. BEESON was elected Vice President in Charge of Sales of Pittsburgh Steel Company at a meeting of its Board of Directors on March 31, 1941.

✦ ✦ ✦

AFTER graduating from Yale University in 1929, Mr. Beeson joined the Pittsburgh Steel Company and worked in the Research Department making a thorough study of wire specialties for a period of five years. In 1935 he was made manager of manufacturer's products sales, and one year later was made assistant superintendent of the Monessen Works. In 1938 he became assistant manager of sales, and in 1939 was appointed assistant general manager of sales which position he held until his new appointment.

✦ ✦ ✦

R. F. Clifford, Personnel Director, Western Electric Company

IT has been announced that **Reese F. Clifford** has been appointed personnel director of the Western Electric Company.

✦ ✦ ✦

MR. CLIFFORD has 30 years of service with Western Electric. He began at the Company's Hawthorne Works, Chicago, in 1910 as a price clerk and 12 years later was made assistant accountant of the Works. He was assistant clerical superintendent of the Kearny, New Jersey, Works for four years and then became superintendent of the production of panel dial telephone switching equipment at the Hawthorne Works. In 1938 he was made manager of the cable and apparatus division there.

✦ ✦ ✦

SINCE January of this year he has been located at Western Electric headquarters, 195 Broadway, New York City, as the Company's assistant personnel director.

A. M. Wolf Transferred to Cutler-Hammer St. Louis Office

A. M. WOLF has been transferred to the St. Louis Office of Cutler-Hammer, Inc., pioneer manufacturers of Electric Control. According to Mr. G. E. Booth, Manager of the Company's St. Louis sales territory, the demand for C-H Motor Control, Safety Switches, Multi-Breakers and allied equipment has more than kept pace with the increasing tempo of industrial activity, and has made necessary this addition to his force.

✦ ✦ ✦

A GRADUATE electrical engineer from the Armour Institute of Technology, Mr. Wolf was employed by the Public Service Co. of Northern Illinois in the Sub-Station Construction Department before joining the Cutler-Hammer organization.

✦ ✦ ✦

STARTING his work with Cutler-Hammer in the Experimental Department, Mr. Wolf was exceptionally well grounded on the design and operation of C-H equipment when he started his sales career. With additional experience gained in the Company's Detroit office, Mr. Wolf is well qualified to serve Cutler-Hammer customers in the St. Louis area.

✦ ✦ ✦

J. K. BEESON
Vice President—Sales
Pittsburgh Steel Company
President, The Wire Association

S. Allen Jacobs, Vice President, Phelps Dodge Copper Products Corp.

IT has been announced that **S. Allen Jacobs,** general sales manager Inca Mfg. division of Phelps Dodge Copper Products Corp., New York, has been elected a vice president of the corporation. Mr. Jacobs assisted in the formation of the Inca Mfg. Company in Fort Wayne and became sales manager when that company was incorporated. He remained in that position when Inca was consolidated with Phelps Dodge. He will continue to maintain headquarters in Fort Wayne.

✦ ✦ ✦

Dean Rollans, General Sales Manager, Wickwire Spencer Steel Company

THE appointment of **Dean Rollans** as general sales manager of the Wickwire Spencer Steel Company and its subsidiary, American Wire Fabrics Corp., New York, was recently announced.

✦ ✦ ✦

MR. ROLLANS succeeds **A. G. Bussman** who has resigned because of ill health. Associated with Wickwire Spencer since 1928 Mr. Rollans spent the first two years in the mid-continent oil field. He was promoted to general credit manager and assistant treasurer in 1930 and in the following years extended his activities to many phases of the company's management.

✦ ✦ ✦

Waterbury Buckle Company Elects Officers

AT the Annual Meeting of the Waterbury Buckle Company, Julius B. Smith was reelected president of the company. Other officers are Jerome R. LaVigne, vice president and treasurer; Martin T. Lynn, second vice president; and Henry E. C. Hill, secretary. Directors for the coming year, elected at the meeting, were C. Sanford Bull, Irving H. Chase, John P. Elton, David C. Griggs, Warren F. Kaynor, Jerome R. LaVigne and Julius B. Smith.

STATISTICS --- FEBRUARY, 1941

PRODUCTION FOR SALE OF IRON AND STEEL PRODUCTS

AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products

February - 1941
PERIOD

		Number of companies	Items	* Annual Capacity Net tons	Production for Sale—Net Tons							
					Current Month				Year to Date			
							Shipments				Shipments	
					Total	Per cent of capacity	Export	To members of the industry for conversion into further finished products	Total	Per Cent of capacity	Export	To members of the industry for conversion into further finished products
STEEL PRODUCTS	Ingots, blooms, billets, slabs, sheet bars, etc.	31	1	xxxxxxx	544,933	xxx	213,088	121,159	1,121,429	xxx	434,041	248,574
	Heavy structural shapes	8	2	5,175,800	321,950	81.1	19,211	xxxxxxx	691,131	82.6	44,966	xxxxxxx
	Steel piling	4	3	360,000	18,125	65.6	1,648	xxxxxxx	40,178	69.0	2,845	xxxxxxx
	Plates—Sheared and Universal	19	4	6,179,470	417,637	88.1	39,977	2,023	859,718	86.0	84,600	4,475
	Skelp	7	5	xxxxxxx	73,517	xxx	10,369	32,950	152,516	xxx	18,246	71,592
	Rails—Standard (over 60 lbs.)	4	6	3,613,600	137,380	49.6	4,940	xxxxxxx	273,330	46.8	17,494	xxxxxxx
	Light (60 lbs. and under)	6	7	302,800	15,310	65.9	6,347	xxxxxxx	32,943	67.3	13,073	xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	1,222	15.6	767	xxxxxxx	3,679	22.3	925	xxxxxxx
	Splice bar and tie plates	15	9	1,300,200	61,593	61.7	672	xxxxxxx	111,376	53.0	3,622	xxxxxxx
	Bars—Merchant	34	10	xxxxxxx	503,565	xxx	66,877	48,268	1,074,730	xxx	130,986	106,848
	Concrete reinforcing—New billet	15	11	xxxxxxx	103,747	xxx	18,797	xxxxxxx	212,352	xxx	38,579	xxxxxxx
	Rerolling	17	12	xxxxxxx	9,394	xxx	682	xxxxxxx	18,454	xxx	1,356	xxxxxxx
	Cold finished—Carbon	19	13	xxxxxxx	91,395	xxx	2,070	xxxxxxx	184,776	xxx	3,915	xxxxxxx
	Alloy—Hot rolled	15	14	xxxxxxx	121,503	xxx	12,158	12,641	249,525	xxx	28,149	24,422
	Cold finished	15	15	xxxxxxx	13,354	xxx	1,916	xxxxxxx	25,886	xxx	3,412	xxxxxxx
	Hoops and baling bands	4	16	xxxxxxx	7,035	xxx	215	xxxxxxx	14,125	xxx	348	xxxxxxx
	TOTAL BARS	52	17	12,678,085	850,043	87.4	102,715	60,909	1,779,848	86.8	206,745	131,270
	Tool steel bars (rolled and forged)	15	18	127,870	8,563	87.3	842	xxxxxxx	16,655	80.6	1,731	xxxxxxx
	Pipe and tube—B. W.	13	19	2,047,200	115,604	73.6	11,139	xxxxxxx	248,991	75.2	15,322	xxxxxxx
	L. W.	9	20	1,080,260	35,092	42.3	1,131	xxxxxxx	75,542	43.3	2,553	xxxxxxx
	Electric weld	5	21	692,520	29,845	56.2	711	xxxxxxx	54,442	48.6	1,023	xxxxxxx
	Seamless	15	22	3,119,190	155,115	64.8	23,906	xxxxxxx	314,518	62.4	31,746	xxxxxxx
	Conduit	6	23	152,145	10,058	86.2	138	xxxxxxx	21,298	86.6	189	xxxxxxx
	Mechanical Tubing	13	24	538,975	38,087	92.1	5,619	xxxxxxx	77,588	89.0	9,508	xxxxxxx
	Wire rods	18	25	xxxxxxx	119,620	xxx	12,867	19,404	249,903	xxx	29,574	42,526
	Wire—Drawn	36	26	2,299,340	161,245	91.4	12,510	1,908	340,194	91.5	24,917	3,856
	Nails and staples	19	27	1,137,090	65,836	75.5	5,580	xxxxxxx	135,909	73.9	9,366	xxxxxxx
	Barbed and twisted	16	28	448,770	22,449	65.2	5,904	xxxxxxx	45,852	63.2	9,836	xxxxxxx
	Woven wire fence	15	29	786,790	25,758	42.7	176	xxxxxxx	52,335	41.1	695	xxxxxxx
	Bale ties	11	30	124,450	4,542	47.6	6	xxxxxxx	8,729	43.4	36	xxxxxxx
	All other wire products	5	31	27,030	406	19.6	-	xxxxxxx	894	20.5	-	xxxxxxx
	Fence posts	14	32	147,645	5,649	49.9	120	xxxxxxx	11,957	50.1	215	xxxxxxx
	Black plate	11	33	560,455	29,449	68.5	974	7	55,264	61.0	1,870	8
	Tin plate—Hot rolled	7	34	866,120	18,948	28.5	5,140	xxxxxxx	39,677	28.3	5,534	xxxxxxx
	Cold reduced	10	35	2,995,300	186,082	81.0	12,187	xxxxxxx	374,520	77.3	28,580	xxxxxxx
	Sheets—Hot rolled	23	36	xxxxxxx	607,016	xxx	29,976	19,523	1,243,494	xxx	60,662	34,377
	Galvanized	14	37	xxxxxxx	145,815	xxx	13,260	xxxxxxx	299,303	xxx	23,186	xxxxxxx
	Cold rolled	15	38	xxxxxxx	274,676	xxx	5,156	xxxxxxx	547,455	xxx	12,056	xxxxxxx
	All other	13	39	xxxxxxx	65,786	xxx	2,181	xxxxxxx	133,667	xxx	3,957	xxxxxxx
	TOTAL SHEETS	26	40	13,280,970	1,093,293	107.3	50,573	19,523	2,223,919	103.6	99,861	34,377
	Strip—Hot rolled	23	41	3,522,980	158,852	58.8	8,549	19,980	332,408	58.4	15,372	42,173
	Cold rolled	34	42	1,371,560	91,121	86.6	1,761	xxxxxxx	185,784	83.8	2,812	xxxxxxx
	Wheels (car, rolled steel)	5	43	422,825	20,526	63.3	11	xxxxxxx	40,338	59.0	145	xxxxxxx
	Axles	4	44	472,280	12,618	34.8	2	xxxxxxx	27,335	35.8	10	xxxxxxx
	Track spikes	11	45	327,275	13,521	53.8	166	xxxxxxx	26,156	49.4	480	xxxxxxx
	All other	3	46	9,100	947	135.7	289	xxxxxxx	1,998	135.8	301	xxxxxxx
	TOTAL STEEL PRODUCTS	131	47	xxxxxxx	4,864,936	xxx	560,035	277,863	10,028,354	xxx	1,118,233	578,851
	Pig iron, ferro manganese and spiegel	24	48	xxxxxxx	602,968	xxx	44,296	180,312	1,266,636	xxx	90,623	391,080
	Ingot moulds	4	49	xxxxxxx	57,388	xxx	57	xxxxxxx	116,095	xxx	85	xxxxxxx
IRON PRODUCTS	Bars	9	50	109,195	4,781	57.1	-	339	9,101	51.5	1	588
	Pipe and tubes	3	51	109,300	4,981	59.4	14	xxxxxxx	10,006	56.6	70	xxxxxxx
	All other	2	52	71,000	1,343	24.7	4	-	3,474	30.3	607	-
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	11	53	224,995	11,105	64.3	18	339	22,581	62.1	678	588

* To be revised.

Total number of companies included - 148.

The estimated average yield of products for sale from ingots produced by the companies included above is 71.2%, which applied to their total ingot capacity equals 57,533,200 net tons of finished rolled products.

Production for sale, less shipments to members of the industry for further conversion, related to the estimated yield is as follows:

Current month	4,587,073 N.T.;	103.9%
Year to date	9,449,503 N.T.;	101.6%

If You Are Not A Member Of The Wire Association—Now Is A Good Time To Join!
The Annual Dues Are $10.00 — For detailed information address
RICHARD E. BROWN, Secretary
300 Main Street, THE WIRE ASSOCIATION Stamford, Conn.

Exports and Imports of Wire

Exports of Iron and Steel Wire Products in Feb. 1941 and Feb. 1940
(In gross tons)

	FEB. 1941	JAN. 1941	FEB. 1940
Wire rods	12,592	10,855	14,417
Strip steel	13,153	18,142	13,559
Plain black or galvanized iron or steel wire	12,776	6,107	10,567
Barbed wire and woven wire fencing	4,167	2,135.	2,014
Woven wire cloth	277	270	296
Wire rope	1,118	1,642	705
Insulated iron or steel wire and cable—see analysis below			
Other wire and manufactures	908	1,135	1,981
Wire nails	3,686	1,787	4,275
Tacks	100	76	71
Other nails, including staples	574	217	239
Bolts, machine screws, nuts, rivets and washers	2,734	3,377	1,185
Total, these 11 classifications	52,085	45,743	49,309

Imports of Iron and Steel Wire Into the United States
(In gross tons)

Concrete reinforcement bars	.....	.....	.....
Hollow bar and drill steel	5	14	196
Wire rods	21	.....	499
Barbed wire	.....	.....	.....
Round iron and steel wire	21	3	120
Telephone and telegraph wire	.....	.....	.....
Flat wire and strip steel	103	184	237
Wire rope and strand	6	34	82
Other wire	.....	1	.....
Hoops and bands	.....	.....	52
Nails, tacks and staples	.....	4	7
Bolts, nuts and rivets	2	2	19
Totals, these 12 classifications	158	242	1,212

Exports of Insulated Wire and Cable, February, 1941

	Foreign		To U. S. Possessions	
	Pounds	Dollars	Pounds	Dollars
Rubber covered wire	873,373	$254,102	110,496	$ 24,342
Weatherproof wire	282,068	87,665	109,295	17,429
Other insulated copper wire	2,977,028	562,332	195,713	31,276
Total, these 3 classifications	4,132,469	$904,099	415,504	$ 73,047

Iron and Steel Exports

EXPORTS of iron and steel products (other than scrap) from the United States in February totaled 525,862 gross tons valued at $34,637,943, according to preliminary figures. In January such exports amounted to 653,798 tons valued at $39,691,003, and in February 1940, 436,585 tons valued at $33,361,201.

✦ ✦ ✦

DESPITE February's showing, exports over the first 2 months of 1941 stand at 1,179,660 tons valued at $74,328,946, against totals of 832,649 tons and $64.514,-566 for the comparable period of 1940.

✦ ✦ ✦

IN February,, shipments to every continental area other than Europe increased materially. The trade with Europe stood at 260,682 tons, against 462,137 in January; but the countries of North and Central America and the West Indies received 107,542 tons of American iron and steel against 92,165 tons, shipments to South America rose to 68,177 from 24,-907 tons, the Far East took 55,359 tons against 49,123, and Africa 34,102 against 25,466.

✦ ✦ ✦

LEADING individual markets in February were the United Kingdom, 248,447 tons; Canada, 75,591; Brazil, 25,526; the Union of South Africa, 24,699; and the Netherlands East Indies, 22,132.

✦ ✦ ✦

AS in recent months, nonalloy steel ingots, blooms, and billets comprised the month's leading export commodity, with exports totaling 114,652 tons, of which 94,058 went to the United Kingdom and 11,349 to Canada. Second place went to pig iron, with shipments of 46,843 tons, of which the United Kingdom received 42,-381 tons; and alloy steel ingots held third place, with a total of 40,568 tons. Other outstanding products in the February export trade were plain structural shapes, 34,012 tons, and nonalloy black steel sheets, 33,943 tons.

✦ ✦ ✦

EXPORTS of scrap from the United States rose in February to 74,378 gross tons valued at $1,455,512, from the January trade of 450,055 tons valued at $902,535, according to preliminary figures. In February 1940, exports of scrap amounted to 234,716 tons valued at $4,137,635.

✦ ✦ ✦

IRON and steel scrap comprised 72,666 tons of the February total and included 14,867 tons of No. 1 heavy melting scrap, 30,124 tons of No. 2 heavy melting scrap, 2,804 tons of baled and bundled scrap, 9,336 tons of cast and burnt scrap, and 15,535 tons of other scrap. Also included in the February total was 464 tons of tin plate circles, etc., 1,032 tons of waste-waste tin plate, and 216 tons of terneplate clippings.

✦ ✦ ✦

THE United Kingdom, the chief purchaser, took 67,876 tons of iron and steel scrap, and Canada followed with a total of 3,037 tons. Shipments to Mexico totaled 1,459 tons of iron and steel scrap and 11 tons of tinplate circles.

✦ ✦ ✦

Imports

IMPORTS of iron and steel products (scrap excepted) into the United States (increasing slightly in quantity although smaller in value) totaled 646 gross tons valued at $143,126 in February, according to preliminary figures. January receipts aggregated 406 tons valued at $157,284, while the trade of February 1940 was just 10 times as great in volume (6,467 tons valued at $666,272) as that of February 1941. Cumulative 1941 imports stand at 1,052 tons valued at $300,410, in contrast with the January-February 1940 total of 14,299 tons valued at $1,-584,898.

✦ ✦ ✦

SWEDEN was the month's chief source of imports, with a 408-

(*Please turn to Page 292*)

Exports and Imports of Wire

(*Continued from Page 291*)

ton total which included 255 tons of "other" pipe and 108 tons of flat wire and steel strips. Second place went to Canada, with shipments aggregating 153 tons, including 71 tons of "other" pipe.

✦ ✦ ✦

IMPORTS of scrap likewise increased—to 150 tons valued at $2,186 from January's 17 tons valued at $71—but remain short of the 273 tons valued at $3,541 received during February 1940. Cumulative imports of scrap for the first 2 months of 1941 stand at 167 tons valued at $2,257, against 715 tons valued at $7,964 received during the first 2 months of 1940.

✦ ✦ ✦

FEBRUARY scrap imports came chiefly from Canada (99 tons), Russia (25 tons), and the United Kingdom (15 tons).

✦ ✦ ✦

SHIPMENTS abroad of rubber-covered wire were valued at $254,102, a decrease of 41.8 percent from the January total of $437,029. Exports of other insulated copper wire were valued at $562,332, compared with $506,715, an increase of 10.9 percent.

✦ ✦ ✦

Insulated Wire and Cable

EXPORTS of rubber-covered wire and cable from the United States in December totaled 629,493 pounds valued at $194,971, compared with 693,451 pounds valued at $175,568 in November, a decrease of 9.4 percent in quantity but an increase of 11 percent in value. During the first 7 months of 1940, average monthly shipments of rubber-covered wire were valued at over $1,150,000, but in the last 5 months, average monthly shipments dropped to $217,000. The United Kingdom, Netherlands West Indies and the Panama Canal Zone accounted for 52 percent of the total with purchases of $78,169, $11,968, and $11,101, respectively, in December.

✦ ✦ ✦

OTHER insulated copper wire and cable sold to world markets in December amounted to 1,617,826 pounds valued at $354,431, decreases of 27.2 and 24.4 percent, respectively, from the November total of 2,221,287 pounds, valued at $468,860. Forty-nine percent of the December shipments went to the Canal Zone, Netherlands Indies, Argentina, and Chile ($97,818, $36,659, $19,796, and $18,443, respectively).

✦ ✦ ✦

Canadian Wire Industry

FACTORY sales of $25,063,379 were reported by the wire and wire goods industry for 1939, including plain and galvanized wire, barbed wire, wire fencing, wire nails, tacks, staples, screws, wire cloth, wire rope, bale ties, upholstering springs and similar commodities, according to the report of the Dominion Bureau of Statistics. The 14 wire-drawing plants reported 2,969 workers and sales of $17,925,241; and the 62 wire goods fabrication establishments had 1,554 workers and sales of $7,138,138. Imports were valued at $2,875,610 and exports at $3,453,485.

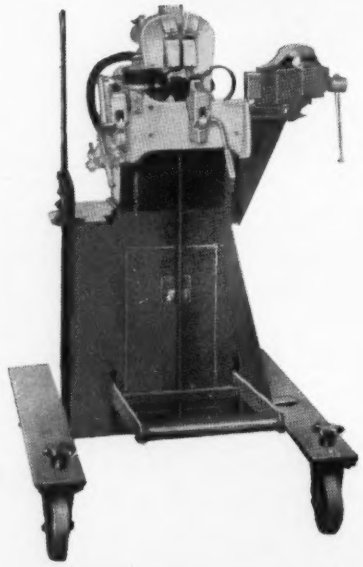
(*Please turn to page 293*)

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

CONTINUOUS IMPROVEMENT

MICRO-WELDERS with dial indicating annealing attachments are now available for high carbon wire.

There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.



MICRO PRODUCTS COMPANY
20 NORTH WACKER DRIVE, CHICAGO, ILL.
Telephone, State 7468

Canadian Wire Industry

(*Continued from Page 292*)

SOME items of raw materials purchased included wire rods at $2,179,736; plain wire, $1,825,-969; galvanized wire, $441,737; other coated wire, $268,738; copper bars, rods, etc., $114,560; brass and bronze, $255,636; lead, $28,-218; tin, $41,251; zinc, $233,132; and other metals, $56,952.

✦ ✦ ✦

Announcing List of American Standards for 1941

THE American Standards Association today announced publication of a new List of American Standards for 1941. In view of the importance of standards and specifications not only for everyday work but to speed up production to meet defense requirements, this particular list of standards will be of unusual interest to industry.

✦ ✦ ✦

MORE than 400 American Standards are listed, covering definitions, technical terms, specifications for metals and other materials, methods of test for the finished product, dimensions, safety provisions for use of machinery, and methods of work. They reach into every important engineering field and serve as a basis for many municipal, state, and federal regulations. Six hundred manufacturing, government and user groups have shared in the development of these standards.

✦ ✦ ✦

THESE American Standards, developed as they are by the industrial groups themselves working through the American Standards Association, represent the best in current practice. Provisions are made for their frequent review in order to keep them in line with a changing industrial set-up. Many of the standards listed here were brought up to date within the last year.

✦ ✦ ✦

THIS List of American Standards for 1941 will be sent free of charge to anyone interested in the work. Requests should be addressed to the American Standards Association, 29 West Thirty-ninth Street, New York, N. Y.

"Versatile" Wire that's ME in the WASHBURN Lines

It's a broad field — kitchen utensils, display racks, small hardware and many other specialty lines — covered by products carrying the well-known name of "Androck." Into these fine quality lines the Washburn Company of Rockford, Illinois, annually fabricates thousands of pounds of Keystone wire.

Compare the wire requirements of a small 30-mesh tea strainer with the shank of a husky screw driver. Quite a contrast in strength, gauge, analysis and finish. For these, and for each type of item between these two extremes, wire uniformity is a "must."

All of which sums up the mastery of fabrication problems, the versatility and dependability contained in Keystone wire.

KEYSTONE

STEEL & WIRE CO. Dept. W PEORIA, ILLINOIS

HIGH CARBON OR LOW CARBON

SAMSON SPRING WIRE

REG. U.S. PAT. OFF. KEYSTONE STEEL & WIRE CO. PEORIA, ILL.

Bright-Tinned Coppered Annealed Galvanized

MIAMI VIA BOSTON?

REACH YOUR OBJECTIVE DIRECTLY!

You want a lead cable encasing press to give low operating and maintenance costs—yet uphold its productive rate through years of punishing service. ROBERTSON Presses offer more value and help you to reach your operating goal more directly.

For the same reasons, all related equipment should be ROBERTSON. The complete unit, ROBERTSON engineered, is installed with less trouble and lost motion . . . it operates as an efficient working whole . . . it produces smoothly and with a minimum of trouble.

That virtually all manufacturers of lead encased cables in the Western Hemisphere use ROBERTSON equipment is evidence of the direct way to reach a profitable operating destination. Write John Robertson Co., Inc., 125-137 Water Street, Brooklyn, N. Y.

ROBERTSON CABLE LEAD ENCASING EQUIPMENT

HYDRAULIC PRESS • HIGH PRESSURE HYDRAULIC PUMP • CLOSED LEAD MELTING POT

Fatigue Tests On Zinc-Coated Steel Wire

(*Continued from Page 285*)

SPECIAL attention was directed to the type of fractures obtained in the twist and bend tests. Poor fractures of a split type generally occurred in specimens containing nonmetallic inclusions.

✦ ✦ ✦

Summary

THE more significant points deduced from the test data presented in this paper include the following:

1. Within the limits of tensile strength investigated, namely, 110,000 to 256,000 psi., the endurance limits of the zinc-coated wires increased with the tensile strength while the endurance ratio diminished.

2. Hot-dip galvanizing depressed the endurance limit of the lead-annealed wire 15.4 to 28.4 per cent, depending to some extent on the grade.

3. No perceptible difference was observed between the endurance limits of the wire hot-galvanized with four and three-and-one-half dip coatings.

4. Reduction by drawing, within the range of wire sizes investigated, increased the endurance limits of the wires in both the lead-annealed and zinc-coated conditions.

5. Steel wires coated by electrolytic processes showed, in all three grades, somewhat higher endurance ratios than were obtained on wires coated by hot-dip methods.

6. Hot-dip coatings developed, under reversed stressing, closely spaced hair cracks perpendicular to and terminating at the surface of the steel. In the electrodeposited coatings no evidence of such cracks could be found after similar treatment.

7. Lack of uniformity in the test results and the abnormal fractures obtained on defective wires, containing surface seams or nonmetallic inclusions, demonstrated the utility of the fatigue test for detecting faulty materials.

8. Although no definite correlation could be observed between the bend and twist test results and the endurance limits of the wire, these tests proved useful in assess-

ing the uniformity of the wire and detecting brittleness therein.

✦ ✦ ✦

Acknowledgments

THE author is indebted to the Hydro-Electric Power Commission of Ontario for permitting publication of these data. He also wishes to acknowledge the assistance of E. J. Mason who prepared the micrographs.

✦ ✦ ✦

Bibliography

[1]Assistant Testing Engineer, The Hydro-Electric Power Commission of Ontario, Toronto, Ont., Canada.

[2]Ground wire cables are seven-strand galvanized steel cables strung between transmission line towers for protection against lightning.

[3,4]"Fatigue Testing Machine for Wire", Engineering, Vol. 138, August 10, 1934, p. 139.

[4]C. P. Wampler and N. J. Alleman, "Fatigue Tests of Wire", ASTM Bulletin, No. 101, December, 1939, p. 13.

[5]H. A. Anderson, "Tension Tests of Thin Gage Metals and Light Alloys", Proceedings, Am. Soc. Testing Mats. Vol. 24, Part II, p. 997 (1924).

[6]S. M. Shelton and W. H. Swanger, "Fatigue Properties of Steel Wire", Research Paper 754, Nat. Bureau Standards (1935).

[7]A. V. deForest and L. W. Hopkins, "The Testing of Rope Wire and Wire Rope", Proceedings, Am. Soc. Testing Mats., Vol. 32, Part II, p. 398 (1932).

[8]Discussion by H. J. Godfrey of paper by C. P. Wampler and N. J. Alleman, "Fatigue Tests of Wire", ASTM Bulletin, No. 101, December, 1939, p. 18.

[9]E. T. Gill and R. Goodacre, "Some Aspects of the Fatigue Properties of Patented Steel Wires," Journal, Iron and Steel Inst., Vol. II, p. 293 (1934).

✦ ✦ ✦

The Impact of War on the Wire Industry

(*Continued from Page 273*)

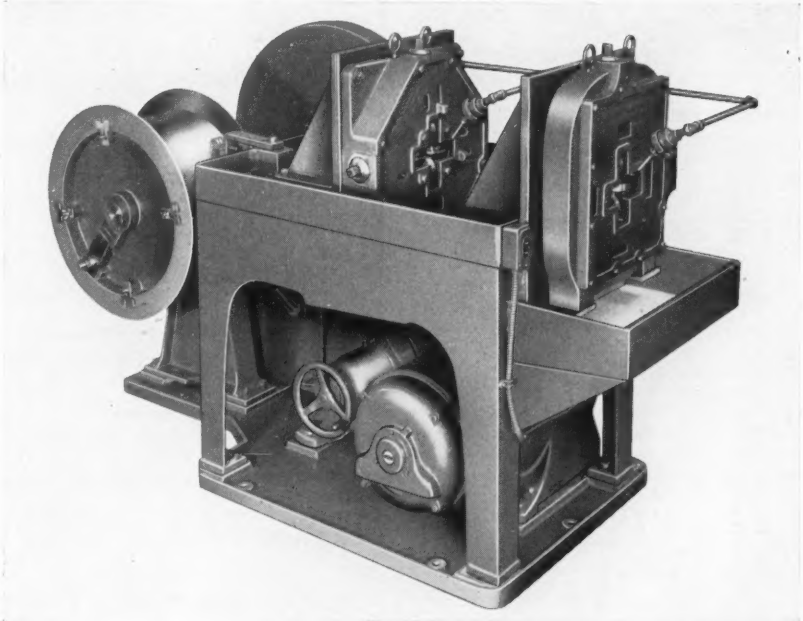
General shares his responsibility with a black-shirt coordinator, just as each technical director of a Russian industrial establishment is saddled with a People's Commissar, to see that none of his rulings lacerates the delicate sensibilities of party members, so each industrial giant in Washington has a New Dealer tied around his neck. He doesn't know exactly why, but he looks forward with grim pleasure to the day when, loosed from the shackles, the dollar-a-year man can tell the inside story.

✦ ✦ ✦

MR. Average Wire Executive is being urged to forget animosity and unite. Unite with whom? With one who has never yet forgotten a grudge, passed up a chance to stab an adversary in the back. He is is asked to jump into the lake to rescue the drowning maiden, and he more than suspects that the gang on the bank will steal his clothes the minute his back is turned.

✦ ✦ ✦

THERE you have the Wire Executive's state of mind. After years of profitless idleness he faces years of profitless prosperity. His taxes are enormous and uncertain, his labor problem the meanest he has ever known, and getting worse. His supplies are threatened, expropriation stares him in the face. The best he can look forward to is a nervous breakdown, and yet he is all set to go. Beneath the bludgeonings of fate his head is bloody but unbowed. There is a ball and chain on his ankle; one hand is tied behind his back, but he has spit on the other. Come on Hitler! come on Bottleneck! lets go!



Low cost production in forming wire shapes with Standard Tandem Turks Heads

Photograph shows a tandem mounting of a No. 4 adjustable draw plate (Turks Head). This unit is equipped with a circulating coolant system, with a variable speed motor drive and a takeup drum of the shedding type. Stands equipped with coolant circulating system are available for all sizes.

This tandem unit will reduce .300" round steel rod to approximately 3/16" square in one pass, at an average production rate of 140' per minute. Capacities from ½" round on the No. 5 Turks Head to .020' on the No. 2.

These Turks Heads can be either Universal or Plain types to produce rectangular, square, keystone, and irregular shapes.

In addition to the type shown above there are available other types arranged for location on bull blocks and draw benches.

Let us discuss possible applications of this machine to your work—address

★

Ask for catalogs showing Standard Swagers, Presses, Draw Benches, Rolling Mills, also.

IT'S STANDARD PRACTICE

MACHINERY COMPANY

PROVIDENCE, RHODE ISLAND

A Review of Recent Wire Patents

No. 2,233,422, METHOD OF COATING COPPER AND ITS ALLOYS, patented March 4, 1941 by Herman J. Lodeesen, Royal Oak, Mich.

In order to retard corrosion, the inventor subjects the surface of the wire to the action of a solution containing an acid phosphate selected from the group consisting of zinc, manganese, cadmium and magnesium and an oxidizing agent selected from the group consisting of chlorates, bromates, periodates, hypochlorites and quinone.

✦ ✦ ✦

No. 2,233,547, STRIP COILING MACHINE, patented March 4, 1941 by Ralph J. Miller and Russell T. Todd, Youngstown, Ohio, assignors to McKay Machine Company, Youngstown, Ohio, a corporation of Ohio.

The machine is adapted to coil narrow or wider metal strip.

✦ ✦ ✦

No. 2,233,737, SEAT SPRING, patented March 4, 1941 by Clare H. Graham, Detroit, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware.

This assembly includes border frames, one of the border frames provided with cross members, springs anchored at one end to the cross members and spacing strips of flexible material connecting the springs together at the other ends, the spacing strips being connected to the end springs of the assembly by a yieldable

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

member, the connection being in the form of a loop of the material of the spacing strip at each end and a small coil spring threaded through the loop and connected at each end to springs in the end row of springs.

✦ ✦ ✦

No. 2,234,068, CONDUCTOR, patented March 4, 1941 by Robert J. Wiseman, Passaic, N. J., assignor to The Okonite Company, Passaic, N. J., a corporation of New Jersey.

Over the vulcanized rubber covering of the wire conductor is a textile base impregnated with a rubber compound including finely divided conducting material in such proportion as to render the rubber compound conductive.

✦ ✦ ✦

No. 2,234,230, SPRING STRUCTURE FOR CUSHIONED SEATS, patented March 11, 1941 by Theodore Burke, Cleveland, Ohio, assignor, by direct and mesne assignments, to John C. Lincoln, Scottsdale, Ariz.

The assembly includes a flexible suspensory means of trapezoidal form rigidly secured at its front and side edges to the front and side rails of the framework, and yielding bracket means pivotally engaged with the rear edge of the suspensory means, this bracket means including a hook-shaped end adapted to be readily slipped upon the rear rail of the frame for engagement therewith.

✦ ✦ ✦

No. 2,234,247, WIRE FABRIC, patented March 11, 1941 by Raymond J. Guba, Philadelphia, Pennsylvania, assignor to Audubon Wire Cloth Corporation, Philadelphia, Pa., a corporation of New Jersey.

A selvage is provided comprising short helically twisted wires interlocking with each other and interlocked with a layer of the fabric strands and arranged in parallel relation with respect thereto.

✦ ✦ ✦

No. 2,234,435, CONDUCTING CABLE, patented March 11, 1941 by Frederick H. Johnson, Ferndale, Mich.

The central core of the cable is provided with fins extending radially and spirally about the longitudinal axis of the core, with fluid conduits connected to the fins.

✦ ✦ ✦

No. 2,234,552, HARDENED NON-FERROUS ALLOY, patented March 11, 1941 by Reginald S. Dean, Washington, D. C., and Clarence T. Anderson, Pittsburgh, Pa., assignors to Chicago Development Company, Chicago, Ill., a corporation of Illinois.

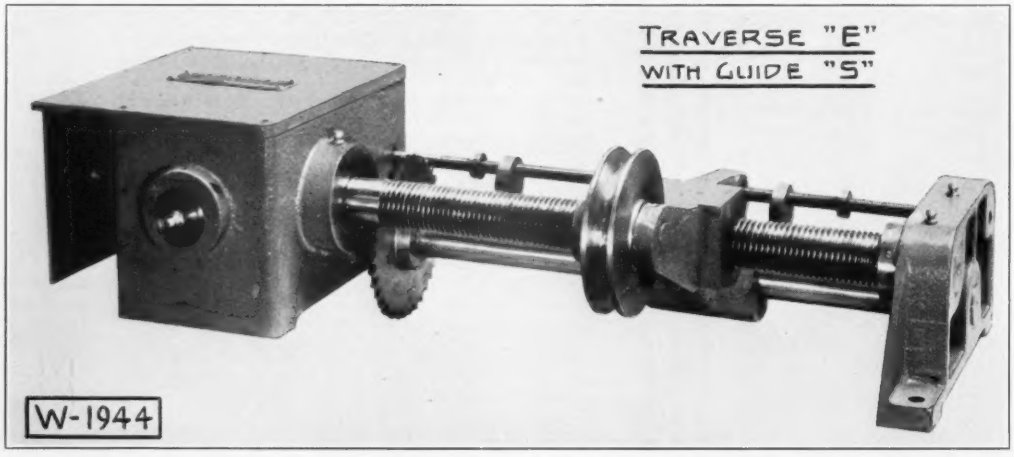
A corrosion-resistant alloy is provided consisting of copper, manganese and

THE WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

AUTOMATIC TRAVERSES FOR ALL APPLICATIONS



Our Latest and Smallest Stock Model is Shown Above

Other Stock Units for Heavier and Heaviest Duty Are Also Available

Bulletins on Request

nickel, hardened by a quenching and aging process, this alloy being characterized by a lower electrical resistance in the hardened state than in the quenched state.

✦ ✦ ✦

No. 2,234,560, COVERED WIRE, patented March 11, 1941 by John J. Keyes, Edgewood, Pa., assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania.

The covering comprises an inner resilient layer of unwoven substantially alkaline-free glass fibers of the staple type applied directly around and over the wire and an outer layer of substantially alkaline-free glass fibers of the continuous type, the outer layer being in the form of a braid of the continuous fibers and being applied directly around and over the inner resilient layer of glass fibers.

✦ ✦ ✦

No. 2,234,671, METHOD OF AND APPARATUS FOR PRODUCING AN INSULATED CORE, patented March 11, 1941 by Ben K. Ford, Westfield, N. J., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

This method, adapted for wire conductors, comprises knitting a cover on the wire, with the wales of the covering extending spirally about the core in one direction, and knitting a second covering on the first covering with the wales of the second covering extending spirally about the core in a different direction.

✦ ✦ ✦

No. 2,234,976, WIRE CUTTING MACHINE, patented March 18, 1941 by Fredric C. Muntwyler, Oak Park, Ill., assignor to Wire Sales Company, Chicago, Ill., a corporation of Illinois.

A pair of rollers is provided, each having a cutter blade positioned to rotate in a path laterally adjacent to the normal path of movement.

✦ ✦ ✦

No. 2,234,996, CABLE-MAKING MACHINE, patented March 18, 1941 by Alanson U. Welch, Jr., and Curtiss M. Cederstrom, Pittsfield, Mass., assignor to General Electric Company, a corporation of New York.

For making a stranded rectangular cable from a number of rectangular strands, the machine includes means to bend the strands progressively without twisting into positions extending around the axis of the group.

✦ ✦ ✦

No. 2,235,523, ELECTRIC CORD, patented March 18, 1941 by Clifford O. Hull, Stratford, Conn., assignor to General Electric Company, a corporation of New York.

There is an outer wrap of fibrous material, having paralleling strands, spirally wound around the spiral wire conductor in parallel relationship with a pitch at least as long as that of the spiral of the conductor to absorb stresses.

✦ ✦ ✦

No. 2,235,536, ELECTRIC CABLE, patented March 18, 1941 by Manuel H. Savage, Bridgeport, and Lyman H. Hitchcock, Milford, Conn., assignors to General Electric Company, a corporation of New York.

Invention lies in the insulation, which comprises the vulcanized product of the polymer being a high molecular weight linear polymer of an iso-olefine and the rubber and polymer being associated in the ratio of, by weight, 1 part polymer to 1 to 2 parts rubber.

✦ ✦ ✦

No. 2,235,814, BEDSPRING, patented March 25, 1941, by Abraham Krakauer, Brooklyn, N. Y., assignor to Kay Manufacturing Corporation, Brooklyn, N. Y., a corporation of New York.

A wire connection is provided between the lower cross bars of the bedspring structure and the spiral springs of the structure.

✦ ✦ ✦

"Ceiling on Lead"

IT may soon be necessary to establish a price ceiling on lead, **Leon Henderson,** Commissioner of Price Stabilization, has said.

✦ ✦ ✦

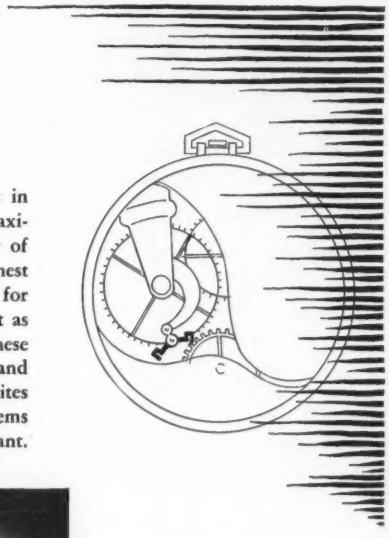
LEADING producers report an unexpected large increase in demand, and there are indications that this excessive demand is due in great part to unnecessary large forward buying and stocking up. Domestic production plus available supplies of foreign lead from Mexico, Canada, Australia, and South America are much more than adequate to meet real consumption at current levels.

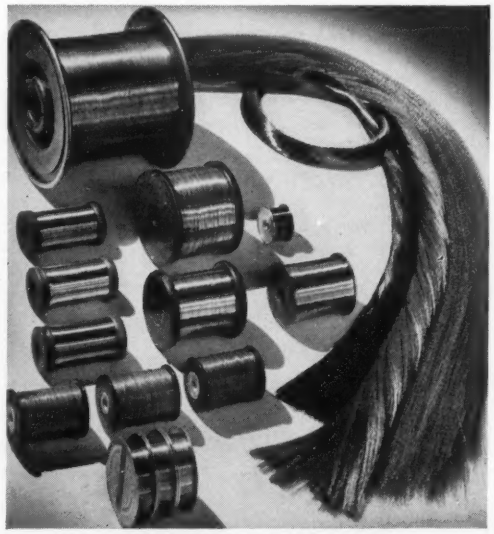
✦ ✦ ✦

IN view of this situation, Mr. Henderson has requested the leading producers to refrain from further increases in the price, which has advanced from 5.50 cents per pounds to 5.85 cents per pound since February 10.

TOLERANCE
1
10,000
OF AN INCH!

That is Callite's outstanding achievement in precision wire drawing. It represents the maximum *allowable* variation in the diameter of Callite wire used for pallet staffs in the finest watches. Your requirements may not call for such accuracy in diameter, yet may be just as exacting in other specifications. Whatever these may be, Callite can meet them uniformly and dependably. Callite's Research Staff invites your inquiries on any and all wire problems that "bottle-neck" production in your plant.





Write for
COMPLETE DETAILS

Callite wires are available in aluminum, steel, stainless steel, Everdur, brass—all grades, brush wire, commercial bronze, nickel-silver alloys and in combinations of these and other alloys. In round, flat and special shapes in sizes down to .002".

CALLITE WIRES
CALLITE TUNGSTEN CORPORATION
572-39th STREET · UNION CITY, NEW JERSEY
Branch Offices: Chicago, Ill. · Cleveland, O.

A WIRE FOR EVERY NEED
CALLITE TUNGSTEN CT

More About The Fine Die Problem

IN connection with the data published in the April issue of WIRE AND WIRE PRODUCTS regarding the difficulty which may arise in connection with the production of diamond wire drawing dies in sizes .002" or smaller, the following letter from Mr. Paul L. Herz will undoubtedly be of interest to the users of such dies.

✦ ✦ ✦

Paul L. Herz
Consultant
12 Brooklands
Bronxville, New York

April 10, 1941

The Editor
Wire and Wire Products
Stamford, Connecticut
Dear Sir:

Referring to the article "Survey of the Fine Die Problem" which I wrote for your February issue and around which two articles were published in the same number, one by the Editor and the other by the Office of Production Management, I would like to state the following. My article was written several months before publication and the fact that some action to relieve the situation in the form of a purchase of dies from the British Purchasing Commission has been taken since is gratifying.

It appears that you, Mr. Editor, and the Office of Production Management do not agree on the figures of yearly consumption of dies by a great margin. I have conducted no inquiry as to the exact figures myself and am therefore not qualified to give an opinion as to whose figures are correct, but I can conclude that there is agreement to the fact that a shortage actually exists which according to you, Mr. Editor, is from 1000 to 3000 dies a year and according to the Office of Production Management may be considerably more than 6250 a year.

I feel that to whatever figure the shortage is placed at we must take into consideration the eventuality of a long war and whatever unforeseen developments are likely to increase this shortage.

First on the list I place the possible extension of the use of fine wire for defense purposes in the electrical, chemical, electro-magnetical and general industrial fields. The mere development of a single apparatus requiring fine hard tough wire (molybdenum or stainless steel for instance), or the need of fine mesh would send the needs for fine dies up considerably.

Another potential need may arise out of the fact that most of the very fine meshed metallic cloth employed in various industries and interesting national defense directly or indirectly was imported and as soon as the stocks on hand will be exhausted we will be looking for fine wire and fine dies to manufacture the mesh in the United States.

I regret, Mr. Editor, that I cannot concur with your statement (paragraph 4, page 240) to the effect that . . . "the manufacture of fine dies .002 and smaller may present some difficulty but nothing of sufficiently great importance to warrant" . . .I leave entirely aside the question as to whether it is good or not that the Government agencies take over control of the industry, for this is a question which is outside of my competence, but the paragraph leaves the impression that the manufacture of dies that size is an easy matter which can be taken up as, and when, needed.

I have for the past twenty years, devoted my time to the creation of the technology and to the building of machines for manufacturing of fine dies, as well as to the methodic training of a great number of young men, and I wish to go on record as stating that it is a very slow and difficult task and that out of many carefully selected men who mostly turned out to be good average workmen in medium size dies, very few could finally be trained to drill down to below .0015. Whichever the method used to arrive at a quick increase of fine dies available in order to meet visible shortage eventually aggravated by unforeseen circumstances, I am still of the opinion that unless something is done about it we are almost certain to run into a serious shortage.

If we compare the trifling amount of money required for stocking a reserve of, let us say, 20,000 dies to the serious inconvenience which would result from a shortage of dies if, and when, needed we must come to the conclusion that quick action must be taken to safeguard the interests of the national defense.

I thank you, Mr. Editor, for the publication of this letter, and beg to remain,

Very sincerely yours,
Paul L. Herz

MOSSPEED BRAIDER CARRIERS

Represent

Improved Braiding at Lower Costs

The patented MOSSPEED spring tension take-up makes it possible to increase the speed of the maypole-type braiding machine. An effective increase of 80% being obtained in many cases.

The new (x) type MOSSPEED high speed carrier permits the rapid changing of tension springs making this an ideal carrier for braiding all kinds of yarn (cotton, rayon, asbestos, jute), in addition to fine strands of copper wire.

Consult our engineers regarding your braiding problems.

Patented
2 BX Mossberg Carrier

2 SE
Copholder

Complete line of both MOSSPEED carriers and metal copholders for all sizes and makes of maypole type braiding machines.

MOSSBERG
Pressed Steel Corp.
18 West Street
Attleboro, Massachusetts, U. S. A.

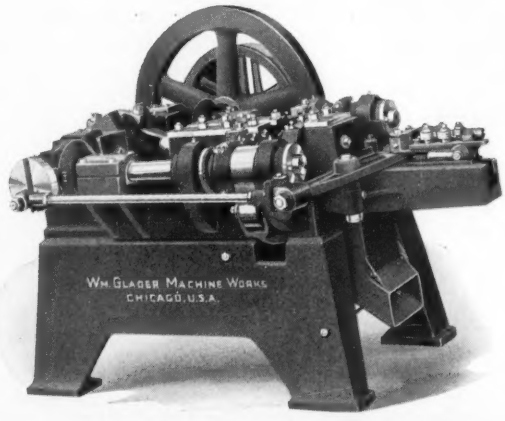
Ross Whitehead & Co., Ltd., Montreal and Toronto, Canada.
James Day (Machinery), Ltd., The Grange, Whetstone, Nr. Leicester, England

ATTENDANCE LIST
Pittsburgh Regional Meeting, The Wire Association

ALBRIGHT, ALVIN T., Wire Supv. of Insp., Jones & Laughlin Steel Corp., Aliquippa, Pa.
AMTSBERG, H. C., Materials Engr., Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
ANDERSON, FRANK M., Gen. Foreman Galv., Pittsburgh Steel Co., Monessen, Pa.
AUSTIN, E. S., Met., Republic Steel Corp., Canton, Ohio.
BAILEY, R. O., Chemist, American Chemical Paint Co., Philadelphia, Pa.
BAKER, E. G., Met., Steel Co. of Canada Ltd., Hamilton, Ontario, Canada.
BEARDSLEE, K. R., Gen. Mgr. Sales, Carboloy Company, Inc., Detroit, Michigan.
BEESON, J. K., V. P. Chg. Sales, Pittsburgh Steel Company, Pittsburgh, Pa.
BEIGHLEY, A. E., Sales Repr., American Chemical Paint Co., Ambler, Pa.
BICKMORE, W. J., Mgr., Jas. H. Matthews & Co., Pittsburgh, Pa.
BRIGHTMAN, H. M., Asst. to Pres., Columbia Steel & Shafting Co., Carnegie, Pa.
BROSHIER, B. C., Assoc. Editor, American Machinist, New York, N. Y.
BROWN, RICHARD E., Publisher, WIRE & WIRE PRODUCTS, Stamford, Conn.
BULLOCK, MAJOR FRANK W., Office of Asst. Secy. of War, Washington, D. C.
BUNKER, JOHN G., Ch. Insp., Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa.
BURKMAN, C. H., Tool Engr., Firth-Sterling Steel Co., McKeesport, Pa.
BURNHAM, R. G., Pur. Agt., The National Screw & Mfg. Co., Cleveland, Ohio.
CALLAGHAN, J. C., Wks. Mgr., Steel Co. of Canada, Ltd., Hamilton, Ont., Canada.
CHRISTIN, R. E., Met., Columbus Bolt Works Co., Columbus, Ohio.
CLARK, H. B., Vascoloy-Ramet Corp., North Chicago, Ill.
CLEMENTS, W. C., Asst. Met. Engr., Bethlehem Steel Co., Bethlehem, Pa.
COPE, S. S., Devl. Engr., Oliver Iron & Steel Corp., Pittsburgh, Pa.
CREWE, L. C., JR., Asst. Supt., Rod & Wire Mill, Bethlehem Steel Co., Bethlehem, Pa.
DAY, B. T., Sales Mgr., American Fire Clay Co., Cleveland, Ohio.
DIMLING, P. E., Salesman, Firth-Sterling Steel Co., McKeesport, Pa.
DOTY, D. R., JR., Wire Mill Met., Jones & Laughlin Steel Corp., Aliquippa, Pa.
ELIAS, H. W., Asst. Mgr., Firthaloy Division, Firth-Sterling Steel Co., McKeesport, Pa.
ELSAISSER, OTTO L., Insp. Supt., Republic Steel Corp., Canton, Ohio.
ERDMAN, H. C., Ch. Engr., National Screw & Mfg. Co., Cleveland, Ohio.
FARNSWORTH, W. B., Ch. Met., Pittsburgh Steel Co., Monessen, Pa.
FAST, PAUL R., Plant Supt., Belden Mfg. Company, Chicago, Illinois.
FISHER, E. J. P., Sales Engr., Salem Engineering Co., North Jackson, Ohio.
GARRETT, C. W., Wire Mill Met., Jones & Laughlin Steel Corp., Aliquippa, Pa.
GARRETT, FRANK, V. P., Universal Cyclops Steel Corp., Bridgeville, Pa.
GASTON, ROY G., Gen. Foreman, Bethlehem Steel Co., Johnstown, Pa.
GEMBEL, P. J., Sales, Armour & Company, Chicago, Illinois.
GLASER, E. S., Supt., National Drawn Steel Co., E. Liverpool, Ohio.
GLEN, A. E., Salesman, Carboloy Company, Inc., Pittsburgh, Pa.
GREENICH, F. J., Met., Western Automatic Mach. Screw Co., Elyria, Ohio.
GRUBER, DONALD W., Hot Mill Met. Supv., Jones & Laughlin Steel Corp., Aliquippa, Pa.
GUION, LIEUT. COL. JAMES L., Executive Officer, Pittsburgh Ordnance District, Pittsburgh, Pa.
HAGEN, J. R., Salesman, Ironsides Company, Pittsburgh, Pa.
HALL, B. W., Sales, Carboloy Company, Inc., Pittsburgh, Pa.
HALL, G. R., Met. Dept., Republic Steel Corp., Canton, Ohio.
HISSRICH, L. P., Wire Sales Dept., Jones & Laughlin Steel Corp., Pittsburgh, Pa.
HOPKINS, H. L., Met., National Screw & Mfg. Co., Cleveland, Ohio.
HUSSEY, R. M., Supt. Wire Dept., Jones & Laughlin Steel Corp., Aliquippa, Pa.
JACKMAN, ALAN, Sales, Firth-Sterling Steel Co., Chicago, Illinois.
JACOB, H. C., Sales, Carboloy Company, Inc., Pittsburgh, Pa.
JENKIN, JOHN M., Salesman, Warner Company, Pittsburgh, Pa.
JENKO, PAUL M., Moslo Machinery Inc., Cleveland, Ohio.

(Please turn to Page 300)

HIGH SPEED WIRE NAIL MACHINE



WM. GLADER MACHINE WORKS

210 N. Racine Ave. Chicago, Illinois

Glader Machines on large head, single-blow roofing nails can be seen in operation at any of the independent wire mills in the United States.

The production figures on common nails shown below, are guaranteed.

SIZE MACH.	SIZE WIRE	MAX. LENGTH OF WIRE	NUMBER OF NAILS PER MIN.	CAP. IN POUNDS PER HR.
#00A	#16	1⅛"	700	37.2
#00	#14	1¼"	550	55
#0	#12	1¾"	450	89
#1	#10	2½"	400	192
#2	#8	3½"	325	310
#3	#4	5"	225	523
#4	#1	7"	190	622
#4s	5/16"	9"	175	1155
#5	⅜"	12"	160	2400

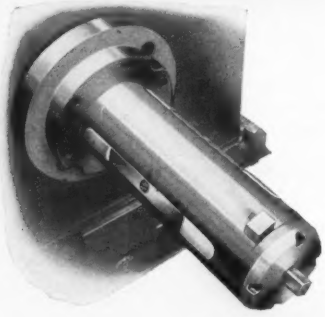
This high output and economical operation account for the GLADER machine being accepted as standard equipment in all recent installations.

ATTENDANCE LIST
Pittsburgh Regional Meeting, The Wire Association

(Continued from Page 299)

JONES, J. L., Industrial Engr., Pittsburgh Steel Co., Monessen, Pa.
KAHL, ROBT. J., Supt. Wire Mill, Pittsburgh Steel Co., Monessen, Pa.,
KELLY, J. HAROLD, Sales Agt., Pittsburgh Steel Co., Pittsburgh, Pa.
KENDALL, C. E., Asst. Sales Mgr., Jones & Laughlin Steel Corp., Pittsburgh, Pa.
KENNEDY, E. J., Ch. Insp., Pittsburgh Steel Co., Monessen, Pa.
KLEIN, H. C., Sales Engr., B. F. Goodrich Company, Akron, Ohio.
LABEKA, C. L., Met., Pittsburgh Steel Co., Monessen, Pa.
LEONARD, J. O., Sales, Swift & Company, Pittsburgh, Pa.
LEWIS, K. B., Consultant, 43 Midland Street, Worcester, Mass.
McCOY, A. W., JR., Firth-Sterling Steel Co., New York, N. Y.
McCRORY, R. J., Ch. Chemist, National Electric Products Corp., Ambridge, Pa.
McINERNEY, W. I., Supt., Pittsburgh Crucible Steel Co., Midland, Pa.
McKENZIE, K. W., Engr., Carboloy Company, Inc., Detroit, Michigan.
MANUELE, J., Dir. Quality Control, Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.,
MARTIN, F. L., Salesman, Warner Company, Pittsburgh, Pa.
MAWHINNEY, R. W., Supt. Wire Mill, National Electric Products Corp., Ambridge, Pa.
MELVILLE, N. F., Mgr. Mfg. Wire Sales, Pittsburgh Steel Company, Pittsburgh, Pa.
MITCHELL, J. B., Supt. Rolling Mills, Jones & Laughlin Steel Corp., Pittsburgh, Pa.
MONTGOMERY, WM., Die Engr., Firth-Sterling Steel Co., McKeesport, Pa.
MORDICA, JOHN W., Sales, Firth-Sterling Steel Co., McKeesport, Pa.
MORITZ, JOHN, JR., Sales Engr., Firth-Sterling Steel Co., Chicago, Illinois.
MORRIS, G. L., Sales Engr., Syncro Machine Co., Rahway, N. J.
MORRISON, J. R., Pres., Morrison Engineering Corp., Cleveland, Ohio.
MOSLO, E. P., Moslo Machinery Inc., Cleveland, Ohio.
MYERS, H. A., Terkelsen Machine Co., Boston, Mass.
NICODEN, PAUL T., Asst. Wks. Mgr., American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
NITCHIE, C. W., Firthaloy Engr., Firth-Sterling Steel Co., McKeesport, Pa.
NOGGS, F. W., Met., Steel Co. of Canada Ltd., Brantford, Ontario, Canada.
OLSON, A. A., Asst. Supt. Rod & Wire, Bethlehem Steel Company, Johnstown, Pa.
ORR, C. E., Electrical Engr., Syncro Machine Co., Rahway, N. J.
PARKIN, WM. M., JR., Sales, Wm. M. Parkin Company, Pittsburgh, Pa.
PRESTON, R. R., Supt. Wire Mill, Page Steel & Wire Div., American Chain & Cable Co., Monessen, Pa.
RECKLEY, E. V., Mgr. Order Dept., Pittsburgh Steel Co., Monessen, Pa.
REDMOND, JOHN H., Captain U. S. Army, Pittsburgh Ordnance District, Pittsburgh, Pa.
REED, W. D., Met. Bar Mills, Jones & Laughlin Steel Corp., Pittsburgh, Pa.
REEDER, A. M., Met. Engr., Jones & Laughlin Steel Corp., Pittsburgh, Pa.
RICHARDS, J. S., Mgr. Met. Dept., American Steel & Wire Co., Cleveland, Ohio.
RITCHIE, LIEUT. COL. S. B., Dir. of Laboratory, Watertown Arsenal, Watertown, Mass.
ROEMER, H. A., JR., Mgr. Sales, Rod & Wire Products, Pittsburgh Steel Company, Pittsburgh, Pa.
ROLLE, SIDNEY, Asst. Mgr., Scomet Engineering Co., New York, N. Y.
S[illegible]N, P., Amtorg Trading Co., New York, N. Y.
SCHMID, A. A., P. A., Pheoll Mfg. Co., Chicago, Illinois.
SCHMIDT, R. H., Supt., Eaton Mfg. Co., Plant #2, Massillon, Ohio.
SEIBERT, J. C., Met., Bethlehem Steel Co., Johnstown, Pa.,
SEYMOUR, H. W., Pittsburgh Steel Co., Monessen, Pa.,
SHANKLIN, D. L., Mgr. Cont. Div., Dewey & Almy Chemical Co., Cambridge, Mass.
SHEARER, R. G., Wire Sales Dept., Jones & Laughlin Steel Corp., Pittsburgh, Pa.
SICKELS, E. D., Adv. Mgr., Wire & Wire Products, Stamford, Conn.
SIEMON, B. W., Met., Pittsburgh Steel Co., Monessen, Pa.
SKEKEL, ALEX, Supt. Wire Products, Pittsburgh Steel Co., Monessen, Pa.
SPENGEL, R. S., Secy.-Treas., WIRE & WIRE PRODUCTS, Stamford, Conn.
STROHM, S. H., Wire Sales Dept., Jones & Laughlin Steel Corp., Pittsburgh, Pa.

(Please turn to Page 301)



Syncro E-x-p-a-n-d-i-n-g Arbors
bring you 8 important advantages

Designed to provide better reel mounting, Syncro expanding arbors for take-ups incorporate the following important advantages.

- They hold reels firmly, thus eliminating destructive vibration.
- They eliminate the need for close tolerances in reel bores.
- They centralize the reel in relation to the supporting arbor.
- Powerful expanding jaws hold reels firmly on high speed machines without the use of driving pins.
- They increase reel life by eliminating wear between arbor and reel bore during spooling.
- Reel changes are made in record time because normally, one turn of the handle is sufficient to loosen a reel.
- A unique, quick acting safety lock, operated by friction and positively held in locked position by centrifugal force, prevents the reel from leaving the arbor under any conditions during operation.
- They greatly reduce noise.

It will pay you to equip your present take-ups with Syncro Expanding Arbors and to definitely specify them for every new take-up you order.

Write for details and prices.

Syncro Machine Company

970 New Brunswick Ave., Rahway, N. J. McCormick Bldg., Chicago

Represented in Canada by — Canadian Elevator Equipment Co., Ltd., Toronto

ATTENDANCE LIST
Pittsburgh Regional Meeting, The Wire Association

(Continued from Page 300)

SULLIVAN, J. J., Wire Research,
Universal Cyclops Steel Corp.,
Bridgeville, Pa.
SWANGER, JOHN S., Major,
Asst. Executive Officer U. S. Army,
Pittsburgh, Pa.
TARTER, P. A., Supt.,
Wyckoff Drawn Steel Co.,
Ambridge, Pa.
THEW, C. H., Wire Mill,
Youngstown Sheet & Tube Co.,
Youngstown, Ohio.
THOMPSON, J. R., Asst. Mgr. Metallurgical,
American Steel & Wire Co.,
Cleveland, Ohio.
TIMBERLAKE, J. E., Wire Dept.,
Jones & Laughlin Steel Corp.,
Pittsburgh, Pa.
TWEEDIE, T. C., Asst. to Wire Mill Supt.,
Pittsburgh Steel Co.,
Monessen, Pa.
VanORMER, L., Asst. Met.,
Jones & Laughlin Steel Corp.,
Aliquippa, Pa.
WEIKEL, G. A., Repr.,
American Chemical Paint Co.,
Chicago, Illinois.
WEISER, P. W., Dist. Mgr.,
Carboloy Company, Inc.,
Pittsburgh, Pa.
WESTBROOK, H. G., Asst. Supt.,
National Screw & Mfg. Co.,
Cleveland, Ohio.
WHITTEN, J. L., Sales Mgr.,
Lee Wilson Engineering Co.,
Cleveland, Ohio.
WINKLER, L. H., Met. Engr.,
Bethlehem Steel Co.,
Bethlehem, Pa.
WOLFE, W. L., Wire Sales Dept.,
Jones & Laughlin Steel Corp.,
Pittsburgh, Pa.
ZAPP, A. R., Mgr., Firthaloy Div.,
Firth-Sterling Steel Co.,
McKeesport, Pa.
ZOUCK, JOHN, Ch. Insp.,
Bethlehem Steel Co.,
Sparrows Point, Md.

Several in attendance failed to register so if the name you are looking for is not on this list, that is the reason.

Steel Industry Is Making New Records

THE LaSalle Extension University of Chicago in its "Business Bulletin" for April 1941 brings out the following interesting facts regarding the new records being established by the steel industry.

✦ ✦ ✦

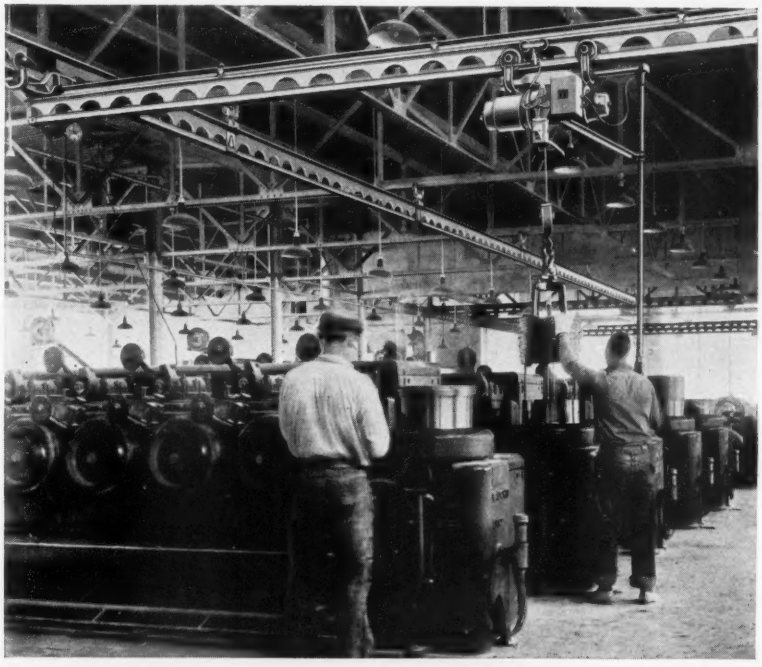
"THE steel mills in the United States have been operating at close to capacity for most of the last month. Output has increased for five consecutive weeks, and for the entire month totaled close to 7,000,000 tons. A year ago operations were at 65 per cent of capacity, and 4,500,000 tons were produced.

✦ ✦ ✦

"EVEN this high rate is not sufficient to meet the large demand. Unfilled orders remain unusually high with many mills reported to have enough business on hand to keep them running throughout most of this year. The industry is expected to operate at full capacity for many months.

"BOTH domestic and foreign demand account for the high rate of steel production. Exports last year were 8,720,000 tons out of a total production of approximately 67,000,000 tons. They were over three times as high as in 1939, and 25 per cent above the previous peak in 1917. Nearly 45 per cent of these exports were to Great Britain, and 12 per cent were to Canada. Exports this year are expected to total over 13,000,000 tons.

"EMPLOYMENT in the industry increased more rapidly than production. The number of workers employed last year was 19% greater than in 1929. Production was only 9% higher. Pay rolls were 14% higher and hourly wages paid to steel workers averaged 30% above the 1929 level. The average work week has been reduced, in the last 11 years, from 55 hours to less than 40. The industry's wages and salaries, last year were about $1,000,000,000."



BLOCK STRIPPING CRANES and CARRIERS

For many years Cleveland Tramrail has been the leading supplier of block stripping cranes and carriers to the Wire Industry, for both internal and external stripping. Hundreds of such units are in operation.

Crane and carrier, illustrated, are easily propelled by hand by means of a rigid arm on lower end of which is a push-button station for convenient operation of hoist. If desired, hoist may be mounted on turn-table for ready service to blocks on two sides of aisle.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO
East 283rd Street Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT
Other products: CLEVELAND CRANES and STEELWELD MACHINERY

Priorities In Copper Fabricating Industry

DESPITE a shortage of copper, establishing priorities is not the answer to the problem of the copper fabricating industry. This was the key message of **C. Donald Dallas,** President of Revere Copper and Brass Incorporated, at the company's annual stockholders' meeting held at Baltimore, Md., recently.

"FOR over six months, Revere Copper and Brass Incorporated has bought every available pound of copper and zinc that we were able to obtain," Mr. Dallas stated, "but at the present greatly increased copper and brass production, we are already facing a potential shortage of both metals. There are now no domestic offerings of copper at any price or for any delivery.

"IT is true that there are high cost marginal mines in this country that are not now operating. They cannot operate profitably unless the price of raw copper advances considerably. A higher copper price, however, would result in less than 5% in increased domestic production. At present, domestic consumption is running at a rate of about 1,500,000 tons a year. This is enough to absorb the entire domestic production of the United States, plus the entire South American production. And the trend of consumption is upward.

✦ ✦ ✦

"THE solution to avoiding an unnecessary increase in the price of copper and also insuring a supply for our national needs can be accomplished by one and the same thing," continued Mr. Dallas, "by getting rid of the present 4c excise tax on copper.

✦ ✦ ✦

"THIS tax is supposed to serve as a protective measure for domestic copper producers against the inroads of foreign copper. However, in normal years of free competition, the foreign price of copper and the domestic price have been practically on a parity, so that the 4c excise tax has failed to maintain a higher price for copper in the United States than abroad. Its only effect has been to prevent a free market for copper in the United States, which is needed at the present time if production schedules are to be increased and prices kept at reasonable levels. In addition, it would help forward the 'good neighbor' policy in Chile—the third most important country in South America."

✦ ✦ ✦

"THE fact that the Government has found it already necessary to purchase hundreds of thousands of tons of copper from South America, absorbing the 4c tax in order to supplement our domestic supply of copper, is the best evidence that this excise tax is not only unnecessary, but unsound."

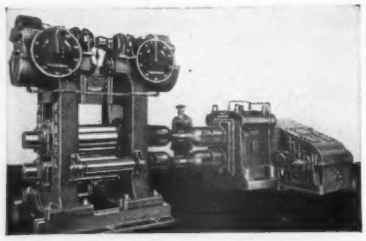
✦ ✦ ✦

MR. DALLAS also pointed out that his company is cooperating to save thousands of tons of zinc, a strategic metal on which priorities have already been established.

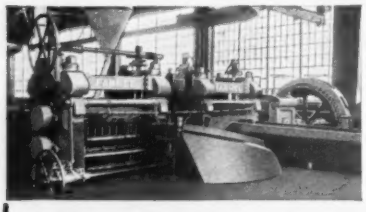
FARREL PRODUCTION UNITS

for

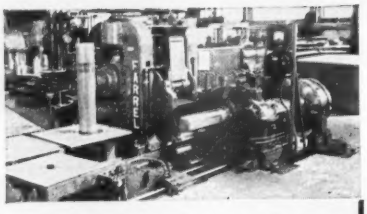
Rolling Mills



Farrel Rolling Mills are built in a wide range of sizes, designed for any specific purpose. At right is shown a 20" x 32" Two-High Cold Strip Mill with drive and pinion stand.



We are prepared to design and install complete rod mills from furnace to coilers for any required output. Illustrated are two 20" x 60" Three-High Breaking Down and Roughing Mills with feed table and repeater.



Farrel Constant Tension Reels are made in several types to fit specific requirements. Illustrated is a reel with jaw-type wrapper, stripper and up-ender installed on a brass finishing mill.

Built-in Skill and Ruggedness for Sustained High Output with Precision

The machines illustrated above are typical of Farrel Rolling Mill Equipment built to meet today's urgent demand for sustained high production with uniform precision. Farrel Production Units have many improved features of design and construction which lead to higher operating efficiency, increased output, lower power consumption, minimum labor and maintenance costs and improved quality products.

Farrel Cold Strip Mills are designed for high precision rolling of brass, copper, aluminum, duralumin and other non-ferrous metals and alloys. They are ruggedly built to take heavy passes at high speed and to do it continuously.

Farrel Rod Mills are designed especially to cut power costs and labor handling, to permit the rolling of a diversified product of high quality, and to give sustained high output with minimum scrap.

Farrel Constant Tension Reels are designed to improve strip quality, increase mill output and reduce rolling cost. They provide constant tension under positive control from empty to full reel, keep the metal flat and straight and maintain uniform gauge.

When you have a problem involving the rolling of metals take advantage of the experienced counsel and expert assistance Farrel engineers can give you.

Farrel-Birmingham Rolling Mill Equipment includes: Rolls—Rolling Mills—Rod Mill Tables and Manipulating Equipment—Universal Mill Spindles—Rod Coilers—Lead Presses for Pipe or Rod—Roll Grinding Machines—Roll Calipers—Gears—Mill Pinions—Pinion Stands—Gear Drives of any capacity—Flexible Couplings.

FARREL

FARREL-BIRMINGHAM COMPANY, Inc.
ANSONIA, CONN.

New York • Buffalo • Pittsburgh • Akron • Chicago • Los Angeles

"WE have worked out a modified silicon-bronze alloy, using no zinc, to replace drawing brass which uses up to 35% zinc. We are also eliminating yellow brass pipe, an alloy with high zinc content, substituting "red brass" pipe having a much lower zinc content. These are initial steps taken by Revere to help conserve the nation's supply of zinc for essential production."

✦ ✦ ✦

"ASKED about the prospects for the year 1941, Mr. Dallas stated, "Virtually the entire production of Revere today is directed towards arming our nation and the allies of democracy beyond our borders. Yesterday, our time-tested system of free democratic enterprise made American Industry the envy of the world. Today, it is the final hope of democracy. While Revere does not make tanks, or planes, or arms, its products are absolutely essential to the effective use of these instruments of defense, because every shell and every cartridge requires brass in its construction, and copper and its many alloys play an important part in most weapons of defense from army field kitchens to battleships.

✦ ✦ ✦

"AT the present time, all the company's mills are running at practically full capacity. From orders on the books, provided sufficient raw materials are available, 1941 production should out-strip that of 1940.

✦ ✦ ✦

"ALONG with satisfactory employment conditions, earnings for 1940 amounted to $2,916,-010.94, which was less than 1c per pound produced. At the same time, despite rising costs of doing business, our customers have been receiving our products at reasonable prices. When such a balance between labor, customers and earnings, exists, the interests of the general public are being served with justice. That is the true test of the American system."

✦ ✦ ✦

No "Contacts" Necessary

A BLUNT warning against individuals or organizations who give the impression that employment of certain agents or "contacts" will help anyone to get a contract under the defense program was issued today by **Donald M. Nelson,** Director, Division of Purchases.

✦ ✦ ✦

"ANY business man who wants to sell goods or services to the Army or Navy can make his contacts direct with the Army and Navy purchasing officers," Mr. Nelson said. "He does not need to join some special organization or take space in a commercial exposition in order to get in touch with these officers or in order to enhance his chance of getting a contract from them.

✦ ✦ ✦

"THE business man is simply foolish if he thinks paying a fee of any sort to any person or organization will make it easier for him to get a defense contract. If any person or organization makes the flat claim that payment of such a fee will expedite the securing of a contract, we would like to know about it. The Department of Justice will be asked to look into all such claims, and will also be asked to investigate any persons who pay the fees."

DRAW SMOOTHER, MORE UNIFORM WIRE ON SCHEDULE

WITH **TECO** CARBIDE WIRE DRAWING **DIES**

For the finer finishes required of wire today . . . and for the constant flow of production that must be maintained, you need dies of unusually smooth, even drawing performance.

Teco Carbide wire drawing dies ably meet these requirements. Hard, tough, and unusually slow to wear, Teco dies give wire a smooth and uniform finish. Teco's dependable, long-life performance cuts down costly interruptions, speeding production all down the line.

A Tungsten Electric engineer will be glad to discuss your wire drawing problems, and point out in your own plant, how Teco Carbide wire drawing dies lower drawing costs, increase production and profit. Investigate!

Pioneers in Tungsten Carbide for over a Quarter of a Century

NEVER SAY DIE . . . *always specify*
TECO CARBIDE DIES
for smooth wire drawing . . . THEY LAST LONGER

Tungsten Electric supplies carbide blanks, tools, bits. Wire and bar dies, tubing, extruding and sizing dies. Also, special tools, such as spot facers, reamers, broaches, form tools, etc.

TUNGSTEN ELECTRIC CORPORATION
564 - 39th ST. • UNION CITY, N. J.
Branch Office: 2900 Euclid Ave., Cleveland, O.

ALL-METAL
FINE WIRE SPOOLS

For Winding and Shipping Fine Steel, Copper, and Enameled Wires

★

Non-Snag winding, light weight, safe and convenient shipping of your fine wires—these are advantages of using an All-Metal Clark Spool. The reasons for these advantages are to be found in the design, construction, and materials used in the spool:

Metals tested for maximum rigidity.

Locked-seam barrel and one-piece ends, permanently and smoothly assembled —no chance of trapping wire at the joint.

Full curl on ends—no rough edges.

Identifying copy embossed in ends.

Finish—gold or copper lacquer, or a variety of colored lacquers.

Spool sizes: 2-7/16″ or 3″ diameter ends; 2-7/16″ size made with 1½″ diameter barrel only, the 3″ diameter with 1½″ or 1¾″ diameter barrel; length of barrel to suit your winding needs.

We will send samples at your request.

J. L. CLARK MANUFACTURING CO.
600 23rd AVENUE • ROCKFORD, ILLINOIS

ARE YOU USING ONE OR BOTH
NORTON ABRASIVES ?

for Shaping, Grinding and Polishing Wire Drawing Dies?

CRYSTOLON ABRASIVE — you'll like the fast cutting action of this hard, sharp silicon carbide abrasive — made in Norton Company's own electric furnace plant under carefully controlled conditions.

NORBIDE ABRASIVE — another Norton electric furnace product — is showing great economy on cemented carbide dies for operations usually performed with diamond dust.

NORTON COMPANY,
Worcester, Mass.

G-75

NORTON ABRASIVES

New Stainless Steel Wire Processing Unit Installed

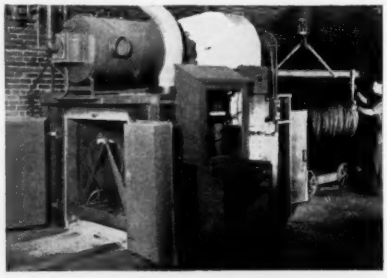
A NEW unit recently installed by the Despatch Oven Company at Allegheny-Ludlum Steel Corporation plant at Dunkirk, New York. for the processing of stainless steel wire turned out 100,000 pounds of material for the first week it was in operation.

✦ ✦ ✦

THE oven has a capacity for a maximum net load of 1000 lbs. of wire per charge with a 30 minute preheat and a 15 minute soak.

✦ ✦ ✦

INSIDE dimensions of the oven are 4′ wide, 6′6″ long, and 4′4″ high. The oven is heated with a Despatch controlled combustion



direct gas-fired DG-500 heater which provides a maximum even temperature of 900 Deg. F.

✦ ✦ ✦

HORIZONTAL air circulation is used with ducts located along each sidewall of the oven. The entire interior is constructed of Allegheny metal. Full automatic temperature control and safety equipment as approved by Fire Underwriters is furnished.

✦ ✦ ✦

THE installation was made by by the Despatch Oven Company, Minneapolis, Minnesota.

✦ ✦ ✦

Peck Spring Company Expands

IT was recently announced by **Lester Peck,** president of the Peck Spring Company, that an addition of 18 feet will be built onto one wing of the Plainville, Conn., plant. The extra room will be used to relieve an overcrowded condition.

Tungsten Needs Cut By Carbide Tools, Official Says

PLACING of tungsten products under the Federal general priorities system, along with aluminum and magnesium, etc., will probably not affect the production of tungsten carbide tools, according to W. G. Robbins, President, Carboloy Co., Inc., General Electric subsidiary and major producers of such tools.

✦ ✦ ✦

IF anything, Mr. Robbins said, it will place greater emphasis on the use of tungsten carbide tools since these tools require only a minute proportion of the amount of tungsten needed for conventional cutting tools.

✦ ✦ ✦

"WHAT is not generally appreciated," Robbins pointed out, "is that some types of tungsten carbide tools enable a vast reduction in the amount of tungsten needed for cutting tool purposes. Tungsten is an important alloying element of conventional high speed steel tools—in which it represents about 18 per cent of the weight of the complete tool.

✦ ✦ ✦

"IN contrast, tungsten is used only in making the Carboloy tip—representing a small proportion of the weight of the entire tool. An average tool, to begin with, actually contains less than one fifth the amount of tungsten needed for a high speed steel tool of the same size.

✦ ✦ ✦

"ON top of this the amount of work a tungsten carbide tool will do before it has to be scrapped may be as high as 50 times that obtained from high speed steel types before they, too, are worn out, with 20 to one as a conservative average. This is due to two reasons: the number of 'pieces per grind' is greater with tungsten carbide tools; and it takes only around .010 inches of grinding to sharpen a tool compared with 1/16 in. for high speed—resulting in ability to recondition the carbide tool a greater number of times than the high speed tool in spite of the greater 'reserve length' of a

(*Please turn to Page 306*)

For **BETTER WIRE**

Copper-coat with CUPRODINE

CUPRODINE creates a denser, tighter, brighter and more uniform coating, in less time. Provides better lubrication for drawing than ordinary copper coating.

Pickle with RODINE

RODINE, added to the pickling bath, saves acid and metal, minimizes brittleness, and lowers pickling costs. Standard the world around.

CHEMICALS ACP PROCESSES

For complete information write

AMERICAN CHEMICAL PAINT CO.
Main Office & Works AMBLER, PENNA.

Bell-Mine Pulverized **LIME**

WARNER COMPANY Lime Bell Mine Products BELLEFONTE DIVISION

FOR WIRE DRAWING

Because the pure limestone is deep mined 700 feet below surface at Bellefonte, is burned in large modern Rotary Kilns under constant engineering supervision, and the lime is check-tested by trained chemists in the Warner Laboratory at the plant

BELL-MINE LIME IS UNIFORM AND PURE

Warner Company
Bellefonte Division

Sales Offices: Pittsburgh, Philadelphia, Bellefonte, N. Y. City

DO THIS
IF YOU WANT LONGER DIE LIFE

Today's urgent necessity to speed-up production makes it important to investigate every method, material or new development that helps achieve this end.

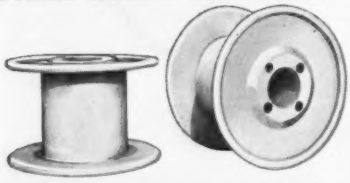
In many well-known wire mills, the standardized use of Oakite Composition No. 24 and other Oakite materials for de-greasing and drawing wire has resulted in longer die life, brighter wire, shorter baking time and other money-saving advantages.

We shall be glad to work with you and make tests to help you establish the same results in your mill. Since there is no obligation, won't you write today?

OAKITE PRODUCTS, INC.
52A THAMES ST. NEW YORK, N. Y.
Representatives in all Principal Cities of U. S. and Canada

OAKITE CERTIFIED CLEANING
MATERIALS · METHODS · SERVICE

APCO MOSSBERG
STEEL REELS & SPOOLS



For The Copper, Steel, & Wire Rope Industry

Apco Mossberg Steel Reels are standard equipment in the wire industry—and for good reason! Apco Mossberg—the original Frank Mossberg Co.—**originated** the steel reel idea and have been training workmen in their manufacture ever since. Personal attention by Apco Mossberg engineers make each job a "special".

FREE ENGINEERING SERVICE

We will gladly submit drawings, blueprints, or suggestions without obligation to you. Write for quotation today.

APCO MOSSBERG CO.
(The Original Frank Mossberg Co.)
21 Lamb Street, Attleboro, Mass.

Tungsten Needs Cut By Carbide Tools, Official Says

(*Continued from Page 305*)

new high speed tool compared with the length of a tip.

✦ ✦ ✦

"TAKING these figures together, it will be seen that one pound of tungsten in a Carboloy tool will do the work of, say, 100 lbs. of tungsten in conventional tools. Thus every pound of tungsten in these tools would be freeing 99 lbs. of tungsten for other purposes."

✦ ✦ ✦

IT was largely for this reason, Robbins said, that Germany some years ago made it virtually mandatory for industry to use tungsten-carbide tools wherever possible—to conserve the supply of tungsten, the other reason being the four to six times greater productivity per machine and per man when carbide tools are used.

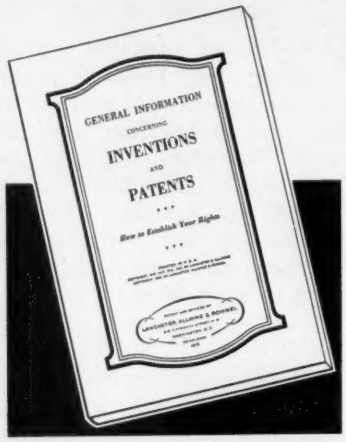
✦ ✦ ✦

IF tungsten carbide tools were used today on all possible applications, the total amount of tungsten that might be needed for carbide cutting tools for both defense and other industries under any now conceivable demand is only around four per cent of the total amount of tungsten consumed in this country for all purposes, Robbins estimated.

✦ ✦ ✦

Germany

THE German press states that political and military developments during the past year have notably strengthened the position of the Reich's iron and steel industry. The continental ore situation, it is stated, has been changed to the great advantage of Germany as a result of the Norwegian campaign, the acquisition of Lorraine and the reestablishment of the customs' union between Germany and Luxembourg. At the same time, ore reserves within the Reich itself have been developed to a point where it is possible that the goal set by the Four-Year Plan for the annual exploitation of about 25,700,000 metric tons of ore has been reached.



Send for a copy - it's free.

Interesting Booklet concerning Inventions, Patents, Trade-Marks and Copyrights, together with Schedule of Government and Attorney's fees, sent free on request. Simply ask for "booklet and fee schedule."

No charges are made for preliminary advice, either in connection with patent, trade-mark or copyright cases.

Lancaster, Allwine & Rommel
Registered Patent & Trade-Mark Attorneys
438 Bowen Bldg., Washington, D. C.

IMMEDIATE RECOGNITION!
ACCORDED THIS FOUR-STAR BOOK

★ Practical ★ Original ★ Interesting ★ Complete

From all quarters has come commendation of this latest ASM book on practical metallurgy. Already four famous engineering schools—Case School of Applied Science . . . University of Wisconsin . . . Brooklyn Polytechnic Institute . . . Stevens Institute of Technology — are planning to use this book as a textbook for their courses in metallurgy.

Typical of other responses is that from Dr. Zay Jeffries, General Electric authority, who says: "The book constitutes a valuable addition to the literature of metallurgy".

If you haven't ordered your copy, do so today. You'll agree when you receive "Practical Metallurgy" that this is the finest book on this subject available today.

PRACTICAL METALLURGY
Applied Physical Metallurgy — Industrial Processing of Ferrous and Nonferrous Metals and Alloys
by
GEORGE SACHS,
Case School of Applied Science
and
KENT R. VAN HORN,
Aluminum Company of America
570 Pages . . . 355 Illustrations . . . 6x9 . . . Red Cloth Bound

$5.00

In addition to 335 general illustrations, PRACTICAL METALLURGY contains 160 constitutional diagrams covering all systems that contain an important commercial alloy. These diagrams . . . the chapters on Plastic Deformation of Ferrous and Nonferrous Metals . . . and the chapter on Internal Stress in Metals contain information not available in any other book published in this country.

Here is the book you've long wanted — a simple yet complete treatise on practical metallurgy.

WIRE & WIRE PRODUCTS
300 Main Street Stamford, Conn.

Inventory Control Methods

ADEQUATE control of materials is one important aspect of the demands of increasing industrial production. To meet production schedules, manufacturing companies must be sure to have the necessary materials and supplies at all times. Shortages can cause costly delays in operations but excessive investment in inventories may be equally objectionable. Under present industrial activity many companies may find it necessary to reexamine and reappraise their inventory control practices.

✦ ✦ ✦

A REPORT "Inventory Control Methods" recently issued by the Policyholders Service Bureau of the Metropolitan Life Insurance Company offers helpful suggestions in this connection.

✦ ✦ ✦

THE report is based on data contributed by a number of industrial companies that are believed to have developed sound practices of controlling inventories of supplies, direct materials, and finished goods. It is not intended to cover the control of work-in-process inventories, nor does it apply to the merchandise control policies of retailers and wholesalers.

✦ ✦ ✦

THE report summarizes specific advantages of a formal system of inventory control, from the financial and operating points of view, and outlines six basic elements which are normally part of a formal system. Methods of classifying inventories and records employed for identification and accounting control purposes are described.

✦ ✦ ✦

THE method of evaluating inventories and of pricing stock withdrawals calls for consideration. The four commonly-used inventory pricing methods are described in detail, as are the various factors to consider in deciding upon the pricing policy to be used. There is special discussion of the relatively new "last-in, first-out" method. The question of determining time and amount for the replenishment of individual stock items is covered as well as the practices followed in this connection.

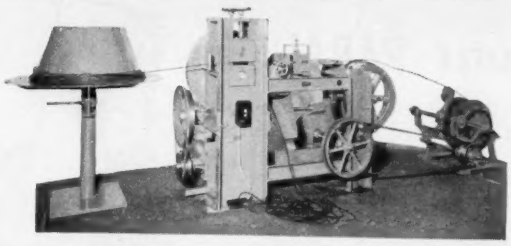
✦ ✦ ✦

A SECTION of the report discusses mechanical or visual unit control, employed as a means of minimizing the record keeping and expense involved in connection with inventory control activities. This should be of special interest to companies with relatively small inventory investments. Mention is also made of inventory adjustment procedures and of provisions for review of stocks to guard against obsolescence.

✦ ✦ ✦

A COPY of this report is available to executives who address the Bureau on their business stationery. Address Policyholders Service Bureau, Metropolitan Life Insurance Company, 1 Madison Avenue, New York, N. Y.

Come to The Worcester Regional Meeting, Worcester, Mass., Thursday, May 15th, 1941.



WIRE INSULATION STRIPPER

EST. 1885 AIMCo INC. 1915
"American" INSULATING MACHINERY COMPANY
REG. U.S. PAT. OFF.
517 West Huntingdon St.
PHILADELPHIA PENNSYLVANIA U.S.A.

for reclaiming weather proof wire from open coils. Removes covering, straightens the wire and winds with traverse on reels.

Motor driven, ball bearing throughout and mounted on welded steel frames.

STEEL WIRE

By MAURICE BONZEL
A NEW BOOK ABOUT WIRE!
495 pages. 414 charts, photomicrographs and illustrations
Translated and Published by Kenneth B. Lewis, Consulting Engineer
Price $15.00
SEND ORDERS TO
WIRE and WIRE PRODUCTS
300 Main Street Stamford, Conn.

METAL SHIELDED WIRE (PATENTED)

A NEW METHOD OF PROTECTING INSULATED WIRES

Seamless ALUMINUM or COPPER Tubing is Drawn over the Wire or Wires in such a manner that ANY kind of a bend can be made and the ends easily trimmed.

Gives Positive Protection to the Wire against Corrosion, Acids, Oils, etc. ★ Pliable, Compact, Light in Weight and Protects Mechanically like Armor. ★ Produces added Stiffness yet can be bent to shortest Radii. ★ Outside Diameter can be held to close Tolerances and any required wall thickness can be made.

SEND FOR FREE SAMPLES

PRECISION TUBE CO.
Specialists in Accurately drawn Seamless ALUMINUM, COPPER and BRASS Tubing in the Smaller Sizes.
3824-26-28 TERRACE ST.
PHILADELPHIA, PA.

Learn about PARALAN

Paralan will give your finished wire and wire products protection from atmospheric corrosion in the mill and in shipping. Paralan-coated wire can be spot welded or soldered without cleaning. Also, Paralan leaves surfaces in good condition for all types of finishes—enameling, japanning, lacquering, plating, etc.

Write for further information. We may be able to solve your difficulties.

AMERICAN LANOLIN CORP.
LAWRENCE, MASSACHUSETTS

STEELSKIN

REG. U. S. PAT. OFFICE

For High or Low Carbon Wire

WIRE DRAWING SOAPS

Established 30 years

R. H. MILLER CO., Inc. Homer, N. Y.

WIRE DRAWING LUBRICANTS FOR

HIGH OR LOW CARBON WIRE, COLD HEADING, BRIGHT AND WET WIRE DRAWING.

STANDARD "WIRE DRAW"

SPECIALLY ADAPTED FOR HIGH SPEED DRAWING MACHINES
BETTER FINISHED WIRE — LOWER DIE COSTS

STANDARD INDUSTRIAL COMPOUNDS CO.

CHICAGO, ILLINOIS

• NEW • NEW •

Combined Wire Drawing and Electric Annealing Machines. Machines in Operation Finishing 30 to 36 B&S at 7000 ft. per min.

ALSO

Combined Wire Drawing, Electric Annealing and Continuous Spooling Machines.
Machines in Operation Finishing 14 to 18 B&S at 3000 ft. per min.
Other sizes under construction.

JOHN COOK ENGINEERING COMPANY

265 North 9th St., Prospect Park
Paterson, N. J.

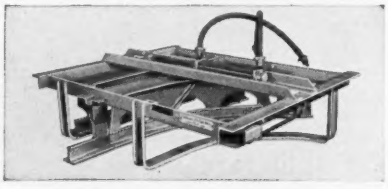
New Air-Operated Switch Developed

A NEW air-operated switch has been developed by the Cleveland Tramrail Division of The Cleveland Crane & Engineering Co., Wickliffe, Ohio, for use on cab-operated, gravity, or automatic dispatch overhead materials handling systems.

✦ ✦ ✦

THIS development enables the tramrail operator to pre-set the switch at some distance ahead while traveling and thus lose no time. Likewise, indexes on gravity or automatic dispatch carriers may be set to actuate trippers which will cause one or several switches to take the positions desired.

✦ ✦ ✦



THE switch is ruggedly built of steel welded. It consists of two main assemblies — an outer supporting frame and an inner sliding frame. The outer frame is designed for bolting rigidly to the super-structure. The inner assembly carrying a straight and a curved rail, rides on multiple easy operating rollers, and is set in position by an air cylinder.

✦ ✦ ✦

SYSTEMS employing Cleveland Tramrail air-operated switches can be furnished in all capacities up to 5 tons.

✦ ✦ ✦

Atlas Tack Corp. To Operate Kentucky Plant

AT the annual meeting of the stockholders of the Atlas Tack Corporation, Roger D. Edwards, President, announced that acquisition of a branch plant at Henderson, Ky., has been acquired under exceptionally favorable inducements and will serve an area in which 60% of the Atlas business is now done. This will effect an important savings in freight charges from the present plant at Fairhaven, Mass.

"Military Inspection of Materials" Features Pittsburgh Regional Meeting

(*Continued from Page 287*)

THE group dispersed with the general feeling that cold heading is a problem worthy of the utmost consideration of the wire and rod producers, cold heading fabricators and ultimate consumers, if the best interest of maximum production, and reasonable profits are to be obtained.

✦ ✦ ✦

IT was the opinion of those present, that this meeting was a most successful one, and appreciated by all in attendance.

✦ ✦ ✦

S. A. BRALEY of **Pittsburgh Steel Company** was chairman of arrangements and was most ably assisted by **A. M. Reeder** of **Jones & Laughlin Steel Corporation.**

✦ ✦ ✦

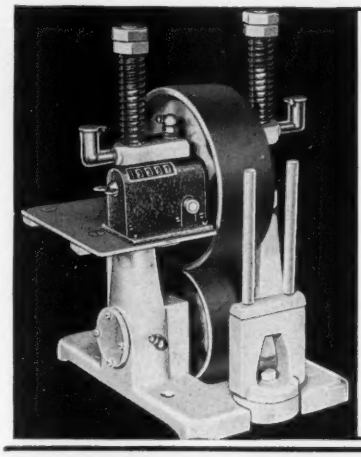
IT is interesting to note that because of general conditions the committee had originally considered omitting this regional meeting this year but the reactions have been so favorable and the comments so complimentary on the meeting that it is felt by all concerned that it was well timed and well worth while.

✦ ✦ ✦

Cadmium Rises to Commercial Importance

THE New York Times recently reported that cadmium, first product to come under scrutiny of the new Office of Price Administration and Civilian Supply, takes a spotlight because of the shortage of zinc, which it resembles in chemical properties. As element 48 it was discovered in 1817 by F. Stromeyer; a by-product of zinc smelting, in natural form it occurs in the mineral greenockite. Its rise to commercial importance is indicated by an output in the United States in 1925 of 500,000 pounds and in recent years of almost 4,000,000 pounds. If it responds to Federal price control it may make economic history.

Come to the Worcester Regional Meeting of The Wire Association, Worcester, Mass., Thursday, May 15th, 1941.



Defense against...
INACCURACY and LOSS!

It's essential to know at all times the exact production of your machines. Productimeter Wire Measuring Units give you accurate lineal count instantly. Many models to choose from . . . the Productimeter Line is the most complete ever offered.

FULL DETAILS IN CATALOG 3
SEND FOR YOUR COPY TODAY!

At left "Type M" . . . sturdy, dependable . . . no adjustment necessary . . . most accurate two-wheel measuring machine made.

DURANT MANUFACTURING CO.
1918 N. Buffum St. Milwaukee, Wis. • 176 Eddy St. Providence, R.I.

NILSON AUTOMATIC PRESS AND FOUR SLIDE MACHINE
FOR SWAGING, STAMPING, PIERCING, BLANKING, FORMING OF COILED METAL

WE also build machines for forming Paper Clips, Buckles, Gate Hooks, Coat and Hat Hooks, Ceiling Hooks, Wire Ears, Cable Rings, Screw Eyes, Sash Chains, Automobile Side Chains, Flat Open Link Chains, Staples, Cotter Pins, Hose Clamps, Etc., and Wire Straighteners, Wire Reels, Frame Bending Machines and Special Presses.

For Complete Details Address —

THE A. H. NILSON MACHINE CO.
BRIDGEPORT, CONN., U. S. A.

NATIONAL RUBBER MACHINERY CO.
AKRON, OHIO

Manufacturers of Equipment for the Rubber, Wire, Wire Rope, Electric Cable, and Plastic Industries.

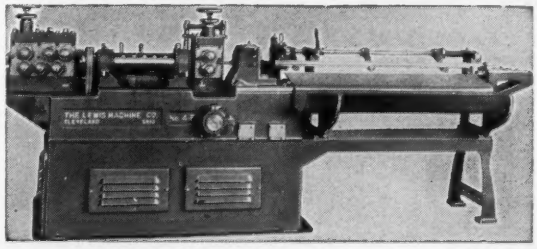
Improved Insulating Machinery for Western Electric Continuous Vulcanizing Process.

Plants: Akron, Ohio; Columbiana, Ohio; Clifton, N. J.

Main Office: Akron, Ohio
The Bawden Machine Co., Ltd., Toronto, Ont., Canada

David Bridge & Co., Ltd., Manchester, England

LEWIS TRAVEL-CUT WIRE STRAIGHTENING and CUTTING Machines



Machines for 1/16" to 3/4" rod
Round
Square
Flat
Hexagon
Ferrous and Non-Ferrous

Automatic
High Speed
Heavy Duty

The Sign of Dependable Service:
WE CAN SUPPLY AND ENGINEER OUR TOOLS EQUIPPED WITH CARBOLOY CEMENTED CARBIDE

THE LEWIS MACHINE CO., 3445 E. 76 St., Cleveland, Ohio

VIANNEY

Famous Wire Drawing Diamond Dies

These famous Diamond Dies are now produced here at moderate prices.

All sizes are in stock or made to order to your specifications

VIANNEY WIRE DIE WORKS

250 E. 43rd. St. New York.
V. J. Boulin, Manager

Wire Drawing and Extrusion Dies made of
DIAMONDS, COMPOSITION, etc.
F. KRAUSE & COMPANY, INC.
250 Ogden Ave. Jersey City, N. J.
Phone JOurnal Square 4-5105

FOR **DIAMOND** AND **CARBIDE WIRE DRAWING DIES** SEE
RUSCH WIRE DIE CORPORATION
275 Seventh Ave., New York, N. Y.

Diamond Dies

DEFENSE requirements for a new stock of diamond dies, to be made available to industry through the Defense Supplies Corporation, will be given preferential treatment over all non-defense needs, it was announced by **E. R. Stettinius, Jr.**, Director of Priorities for the Office of Production Management.

✦ ✦ ✦

ALLOCATION of the dies to defense industries will be put before the Minerals and Metals Section of the Priorities Division for decision, Mr. Stettinius said. **Dr. E. M. Hopkins** is the executive of this section. The recommendations adopted will then be turned over to the Defense Supplies Corporation, which will handle all applications and the actual distribution.

✦ ✦ ✦

Service and Information Office Established

THE establishment of a Service and Information Office in the Department of Commerce has been announced by John E. Sinnott, New York District Office Manager, Bureau of Foreign and Domestic Commerce, Commerce Department.

✦ ✦ ✦

THE primary objective of the new office will be to put businessmen in direct touch with the government official who can best give consideration to the particular problem presented, wherever possible. Quarters for the Service and Information Office have been established in Room 1060 just off the main lobby of the Department of Commerce Building.

BALLOFFET

Diamond Dies

Skill and accuracy in manufacture with the use of selected stones make Balloffet Diamond Dies the choice of the most critical users.

•

Quality Diamond Dies Since 1870

BALLOFFET DIES AND NOZZLE CO., INC.
68-25 Adams at 68th Street
Guttenberg, New Jersey

DIAMOND DIES
.000's to .102
Fort Wayne Wire Die, Inc.
2002 S. Harrison Fort Wayne, Ind.

DIAMOND CARBIDE
DIES
KELLY
WIRE DIE CORPORATION
19 W. 34th St. New York

Use The Quality **WAYNE DIE**
WIRE DRAWING DIAMOND DIES

Write us today for prices and particulars.

Accuracy, long life at high speed and dependability is built into each Wayne die by skilled craftsmen, experienced in the making of quality dies. Only the best quality diamonds are used.

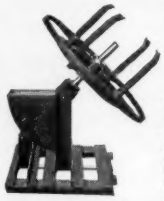
Wire drawers state that "Wayne dies are the best value obtainable".

Wayne Wire Die Co., Inc. 133 MOUNTAIN ROAD, JERSEY CITY, N. J.
Telephone: Journal Square 4-4311

Wire Drawing Diamond Dies

COCHAUD
WIRE DIE CORPORATION
300 W. 56th St., NEW YORK
Tel. Col. 5-1340

Continuous Straightening and Cutting Machinery
With
FLYING SHEAR
for round and shaped wire.
✦ ✦ ✦
THE HALLDEN MACHINE COMPANY
THOMASTON CONNECTICUT



UNIVERSAL WIRE REEL
Quickly and easily adjusted to any angle within 90 degrees. Cut shows one angle.
Write for circular R
THE F. B. SHUSTER CO.
New Haven, Conn.
Straightener Specialists Since 1866

WIRE MACHINERY SPECIALISTS
3—Nilson No. 1, 3 & 4 4 Slide Wire Machines
2—Baird No. 3 & S3F 4 Slide Wire Machines
7—Waterbury Step Cone Wire Drawing Machines
1—Two Spindle Bull Block Motor Driven
6—Lewis Welding Wire S & C Machines M. D.
2—Shuster Shaped Wire S & C Machines ½" & 7/16"
8—Shuster Round Wire S & C Machines 1/32"-3/16"
Wanted: Tack Making Machinery. All Sizes.
NATIONAL MACHINERY EXCHANGE
128-138 MOTT ST. NEW YORK, N. Y.

Hy-Carbo Steel Co.
EST. 1917
✦ ✦ ✦
HIGH GRADE CUSTOM WIRE DRAWING
In Rounds
Less Ton Lots A Specialty
✦ ✦ ✦
LOWELL, MASS.

Annealing Pots and Boxes
Galvanizing Kettles
Lead and Spelter Pans
Pressure Vessels
NATIONAL ANNEALING BOX CO.
Established 1895
Washington, Penna.

"THE SHIFTWEIGHT"
TILTING WIRE REEL
One man loading reel = for wire coils up to 300 pounds.
MOSLO MACHINERY, INC.
CLEVELAND, OHIO

New Cam Operated Master Speeds Up Production

SPEED up of production, through reduced fatigue, is the result claimed for the new line of Cutler-Hammer cam operated, mill duty controllers — Bulletin 14951. Extreme ease of operation with positive feel of all speed positions is obtained by using an adjustable compression type of star wheel spring.

✦ ✦ ✦

AVAILABLE in two speed, three speed, and multi-speed types, the controllers are ideal for mill auxiliaries, crane hoist, bridge, and trolley applications.

✦ ✦ ✦

IT is, however, a particularly unusual combination of features that make this new equipment of immediate interest. Following are some of the outstanding points. Contracts are vertical, double break, silver to silver. Cam shaft operates on ball bearings sealed

against dust. Easily accessible terminal board simplifies installation and service. A heavy cast case and cover, for either separate or bench board mounting, provide protection from dust and mechanical injury.

✦ ✦ ✦

OPTIONAL features include: spring return; off position latch, two, three, or five speeds.

Make your plans now to attend the Annual Convention of The Wire Association to be held at the Hotel Philadelphian, Philadelphia, Pa., October 20-24, 1941.

GEORGE D. HARTLEY
CONSULTANT & SPECIALIST
In Wire Manufacturing & Wire Forming Equipment
Development & Research
New Processes — Designing
Inventions — Patents
372 MAY ST., WORCESTER, MASS.

KENNETH B. LEWIS
CONSULTING ENGINEER
Wire Mill Equipment, Layout and Practice
43 Midland St., Worcester, Mass.
Phone: Worcester 5-6033

Wire Drawing Machinery
Featuring —
High Speed Upright Cone Machines.
Also —
Bull Blocks and Benches, Continuous Wire Drawing Machines, Spoolers, Pointers, String-up Machines, etc.
And —
Cold Heading Machinery.
WATERBURY FARREL FOUNDRY & MACHINE CO.
Waterbury, Conn.

FOR SALE
Bellis Salt Annealing Equipment for Annealing Rods and Wire.
SENECA WIRE & MFG. CO.
FOSTORIA, OHIO

WANTED
7 strand wire twister—suitable for making wire clothesline.
Address Box 329
WIRE & WIRE PRODUCTS.

WANTED—SUPERINTENDENT
Small factory making music and piano wire wants energetic, capable man. Only men fully qualified in this particular field with records of past achievements need apply. Opportunity for right man to create entirely independent position with participation in Company. State salary, qualifications, etc. Strict confidence if employed at present.
Address Box 328
WIRE & WIRE PRODUCTS

EYELETS
ZINC WIRE
ZINC STRIP
THE PLATT BROS. & CO.
WATERBURY, CONN.

Designers and Builders of Gas-Fired Heat Treating Furnaces for Ferrous and Non-Ferrous Wire.
SURFACE COMBUSTION CORPORATION
Main Plant and General Offices—Toledo, Ohio

WIRE DRAWING MACHINERY AND EQUIPMENT
Rod Frames — 16" Frames, 8" Frames — Take-Up Frames, Wire Pointers — Puller Tongs.
General Castings for Wire Mill use. Circulars on Request.
E. J. SCUDDER FOUNDRY & MACHINE CO.
TRENTON, N. J.

RUESCH
Machinery For
Wire, Tube, and Brass Mills
409 Mulberry St., Newark, N. J.

BRODEN
Wire Mill and Cold Rolling Equipment
Broden Construction Co.
22800 Lakeland Blvd.
CLEVELAND, OHIO

WATERPROOF
and
CREPE PAPER
In rolls of any size for wrapping coils and reels.
CREPE-KRAFT BARREL LINERS
THE CREPE-KRAFT CO., INC.
Tel.: Market 2-0375
112 Adams St. Newark, N. J.

SPOOLS AND REELS
FOR THE WIRE INDUSTRY
Hubbard Spool Company
1622 Carroll Ave. Chicago, Ill.

ROSS ROD • WIRE BAKER
J. O. ROSS ENGINEERING CORP.
350 Madison Avenue, New York, N. Y.
CHICAGO DETROIT PITTSBURGH, PA.

Ian F. McRae, Manager, Peterborough Works, Canadian General Electric Company

IAN F. McRAE will assume one of the most important industrial posts in Canada, in his appointment to the position as manager of the Peterborough Works of Canadian General Electric Co., Ltd.

✦ ✦ ✦

MR. McRAE first joined the company in 1925 as an apprentice in the test department, now he takes charge of C.G.E.'s largest plant.

✦ ✦ ✦

HE was born and educated in Vancouver and has spent his entire business career at the Peterborough Works of C.G.E., with the exception of a short time at the company's Davenport Works in Toronto. After two years in the test department at Peterborough, he was transferred to the engineering department. By 1937 Mr. McRae's work had earned him promotion to the responsible position of assistant to the works manager, a position he now leaves to take full charge of the plant.

✦ ✦ ✦

MR. McRae is a member of the Engineering Institute of Canada and is a registered professional engineer of Ontario. He is a past chairman of the Central Ontario Division of the Industrial Accidents Prevention Association.

✦ ✦ ✦

A. E. DYMENT has retired as chairman of the board of directors of the Canadian General Electric Co., Ltd., but remains on the board to which he was first elected 34 years ago.

✦ ✦ ✦

MR. DYMENT is succeeded by **D. C. Durland**, president of the C.G.E., who assumes the additional position of chairman of the board.

✦ ✦ ✦

MR. DURLAND was the first American representative on the Canadian board of C.G.E. when the U. S. General Electric purchased control of its Canadian namesake back in 1924.

ROYLE
PATERSON N.J.
BUILDING EXTRUDERS SINCE 1880
Insulating Machinery for Western Electric Continuous Vulcanizing process.
JOHN ROYLE & SONS
PATERSON, N. J.
British Agency: James Day (Machinery) Ltd., The Grange Whetstone Nr. Leicester, England

MANUFACTURERS OF
WIRE BRAIDING—SPOOLING—TAPING
WINDING AND SPECIAL MACHINES
SINFRA WIRE COVERING MACHINES
FIDELITY MACHINE CO.
3908-18 Frankford Ave., Phila., Pa.

JLE SPARK - TESTING EQUIPMENT JLE
FOR
INSULATED WIRE AND RUBBER HOSE
JAMES L. ENTWISTLE
43 CHURCH ST. PAWTUCKET, R. I.

DAVIS
SPARKERS
R. L. DAVIS ELECTRIC CO.
340 Center Street,
Wallingford, Conn.

WRAPPING MACHINES
Coil & Straight Length
TERKELSEN MACHINE CO.
320 A Street Boston, Mass.

SCOTT TESTERS
For WIRE, RUBBER, TEXTILES, PAPER, Etc.
HENRY L. SCOTT CO.
PROVIDENCE, R. I.

Everything for the Wire and Cable Industry.
Let us estimate on your need!
NEW ENGLAND BUTT CO.
PROVIDENCE, R. I.

WIRE, WIRE ROPE AND ELECTRIC CABLE MACHINERY
THOMSON-JUDD
WIRE MACHINERY COMPANY
SUBSIDIARY OF
THOMSON-GIBB ELECTRIC WELDING COMPANY
LYNN, MASSACHUSETTS
WRITE FOR CATALOGUE

Index to Advertisers

A

American Chemical Paint Co. 305
American Insulating Machinery Co. 307
American Lanolin Co. 308
Apco-Mossberg Co. 306

B

Balloffet Dies & Nozzle Co. 310
Bethlehem Steel Co. 263
Broden Construction Co. 312

C

Callite Tungsten Corp. 297
Carboloy Company, Inc. 261
Carl-Mayer Corp., The 267
Clark, J. L., Mfg. Co. 304
Cleveland Tramrail Div. of Cleveland Crane & Eng. Co. 301
Cochaud Wire Die Corp. 310
Cook, John, Engr. Co. 308
Crepe-Kraft Co., Inc., The 312

D

Davis, R. L., Electric Co. 312
Durant Mfg. Co. 309

E

Electric Furnace Co., The ..... Back Cover
Entwistle, Jas. L. 312

F

Farrel-Birmingham Co., Inc. 302
Fidelity Machine Co. 312
Firth-Sterling Steel Co. 270
Fort Wayne Wire Die, Inc. 310

G

Glader, Wm., Machine Works 299

H

Hallden Machine Co., The 311
Hartley, Geo. D. 311
Hubbard Spool Co. 312
Hudson Wire Co. ..... Inside Back Cover
Hy-Carbo Steel Co. 311

K

Kelly Wire Die Corp. 310
Keystone Steel & Wire Co. 293
Krause, F. & Co., Inc. 310

L

Lee Wilson Engr. Co. ..... Inside Front Cover
Lancaster, Allwine & Rommel 306
Lewis, K. B. 311
Lewis Machine Co., The 309

M

Micro Products Co. 292
Miller, R. H., Co. 308
Morgan Construction Co. 268
Moslo Machinery, Inc. 311
Mossberg Pressed Steel Corp. 298

N

National Annealing Box Co. 311
National Machinery Exchange 311
National Rubber Machy. Co. 309
New England Butt Co. 312
Nilson, A. H., Machine Co. 309
Norton Company 304

O

Oakite Products, Inc. 306

P

Pittsburgh Steel Co. 266
Platt Brothers & Co. 312
Precision Tube Co. 307

R

Robertson, John, Co., Inc. 294
Ross, J. O., Engineering Corp. Division of Ross Industries Corp. 312
Royle, John & Sons 312
Ruesch, H. J., Machine Co. 312
Rusch Wire Die Corp. 310

S

Scott, H. L., Co. 312
Scudder, E. J., Foundry & Machine Co. 312
Seymour Mfg. Co. 265
Shuster, F. B., Co., The 311
Sleeper & Hartley, Inc. 279
Standard Industrial Compounds Co. 308
Standard Machinery Co. 295
Stevens Metal Products Co. 269
Surface Combustion Corp. 312
Syncro Machine Co. 300

T

Terkelsen Machine Co. 312
Thomson-Judd Wire Machy. Co. 312
Tungsten Electric Corp. 303

V

Vascoloy-Ramet Corp. 264
Vaughn Machinery Co. ..... Front Cover
Vianney Wire Die Works 310

W

Warner Co. 305
Waterbury Farrel Fdry. & Mach. Co. 311
Watson Machine Co. 296
Wayne Wire Die Co. 310

WHERE TO BUY

For more complete information, consult the annual Wire and Wire Products Directory, Index & Buyers' Guide.

ABRASIVES—
Norton Co., Worcester, Mass.

ACCUMULATORS—
Farrel-Birmingham Co., Inc., Ansonia, Conn.

AIR DRAW FURNACES—
Carl-Mayer Corp., The, Cleveland, Ohio.

ANNEALING MACHINES—Open Flame
Drever Co., The, Philadelphia, Pa.
Syncro Machine Co., Rahway, N. J.

ANNEALING POTS AND BOXES—
National Annealing Box Co., Washington, Penna.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.

ANODES—Nickel
Seymour Mfg. Co., Seymour, Conn.

ARMORING EQUIPMENT—
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

AUTOMATIC SPARK TESTING EQUIPMENT—
Entwistle, James L., Pawtucket, R. I.

BAKERS—Hi-Speed
Carl-Mayer Corp., The, Cleveland, Ohio.

BAKERS—Rod and Wire
Carl-Mayer Corp., The, Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Moslo Machinery, Inc., Cleveland, O.
Ross, J. O., Engineering Corp., New York, N. Y.

BANBURY MIXERS—
Farrel-Birmingham Co., Inc., Ansonia, Conn.

BERYLLIUM COPPER—Strip and Bars
Callite Tungsten Corp., Union City, N. J.

BLOCKERS—
Farrel-Birmingham Co., Inc., Ansonia, Conn.

BOBBINS—Braider and Wire Weaving
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

BORON CARBIDE—
Norton Co., Worcester, Mass.

CALIPERS—Roll
Farrel-Birmingham Co., Inc., Ansonia, Conn.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

CASTINGS—Wire Mill
Farrel-Birmingham Co., Inc., Ansonia, Conn.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CHEMICALS—Cleaning
American Chemical Paint Co., Ambler, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANERS—Hand and Metal
Standard Industrial Compounds Co., Chicago, Ill.

CLEANING & PICKLING EQUIPMENT—
Broden Construction Co., Cleveland, O.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Lee Wilson Engineering Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CLOTH TESTERS—
Scott, Henry L., Co., Providence, R. I.

CLOTH—Wire, All Metals
Callite Tungsten Corp., Union City, N. J.

COATING—Protective
American Lanolin Corp., Lawrence, Mass.

COILERS—Sheet, Strip and Wire
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.

COILERS AND SPOOLERS FOR INSULATED WIRES—
Entwistle, James L., Pawtucket, R. I.

COLD HEADERS—
Waterbury Farrel Fdry. & Machine Co., Waterbury, Conn.

COMPOUNDS—Wire Drawing
Standard Industrial Compounds Co., Chicago, Ill.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WHERE TO BUY, Continued

CRANES—Wire Mill
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Vascoloy-Ramet Corp., North Chicago, Ill.

DIAMONDS—Industrial
Callite Tungsten Corp., Union City, N. J.

DIAMOND POWDERS—
Rusch Wire Die Corp., New York, N. Y.

DIAMOND TOOLS—
Rusch Wire Die Corp., New York, N. Y.

DIES—Diamond
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Co., New York, N. Y.
Fort Wayne Wire Die, Inc., Fort Wayne, Indiana.
Kelly Wire Die Corp., New York, N. Y.
Krause, F., & Co., Inc., Jersey City, N. J.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Jersey City, N. J.

DIES—Lead Extrusion
Robertson, John, Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Cochaud Wire Die Co., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Fort Wayne Wire Die, Inc., Fort Wayne, Indiana.
Kelly Wire Die Corp., New York, N. Y.
Krause, F., & Co., Inc., Jersey City, N. J.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Jersey City, N. J.

DIES—Rod and Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.

DRAW BENCHES—
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I.
Vaughn Machinery Co., Cuyahoga Falls, O

DRUMS—Flange Steel
Stevens Metal Products Co., Niles, O.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

ENGINEERS—Consulting Wire Mill
Hartley, George D., Worcester, Mass.
Lewis, Kenneth B., Worcester, Mass.

EQUIPMENT—Insulation Testing
Davis, R. L., Electric Co., Wallingford, Conn.
Entwistle, James L., Pawtucket, R. I.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FLASH BAKER—
Carl-Mayer Corp., The, Cleveland, Ohio

FURNACES—Annealing
Carl-Mayer Corp., The, Cleveland, O.
Drever Co., The, Philadelphia, Pa.
Electric Furnace Co., Salem, O.
Lee Wilson Engineering Co., Cleveland, Ohio
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Lee Wilson Engineering Co., Cleveland, Ohio
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Brazing
Electric Furnace Co., Salem, O.
Firth-Sterling Steel Co., McKeesport, Pa.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, O.
Lee Wilson Engineering Co., Cleveland, Ohio
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Electric
Electric Furnace Co., Salem, O.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Hardening and Tempering
Carl Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Lead Melting
Electric Furnace Co., Salem, O.
Robertson, John, Co., Brooklyn, N. Y.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Non-Oxidizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Normalizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Salt Bath
Electric Furnace Co., Salem, O.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Lee Wilson Engineering Co., Cleveland, O.
Surface Combustion Corp., Toledo, Ohio.

GALVANIZING EQUIPMENT—
Lee Wilson Engineering Co., Cleveland, Ohio

GALVANIZING KETTLES—
National Annealing Box Co., Washington, Pa.

GATES—Blast, For Low Pressure Air
Farrel-Birmingham Co., Inc., Ansonia, Conn.

GEARS—Continuous Tooth Herringbone
Farrel-Birmingham Co., Inc., Ansonia, Conn.

GEARS—Wire Mill
Farrel-Birmingham Co., Inc., Ansonia, Conn.

GRINDERS—ROLL
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Norton Co., Worcester, Mass.

HI-SPEED BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio.

HOISTS—Electric Traveling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

INHIBITORS—
American Chemical Paint Co., Ambler, Pa.

INSTRUMENTS—Electrical
Entwistle, James L., Pawtucket, R. I.

KETTLES—Galvanizing, Annealing, Tinning, etc.
Farrel-Birmingham Co., Inc., Ansonia, Conn.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LIME—
Warner Co., The, Bellefonte, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Miller, R. H., Co., Homer, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
Miller, R. H., Co., Homer, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Robertson, John, Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.

MACHINERY—Bunching
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Mach'y. Co., Phila., Pa.
Entwistle, James L., Pawtucket, R. I.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Coilers
Broden Construction Co., Cleveland, O.
Entwistle, James L., Pawtucket, R. I.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
Cook, John, Engr. Co., Paterson, N. J.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Covering Wire
Fidelity Machine Co., Philadelphia, Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., The, Cleveland, O.
Moslo Machinery Inc., Cleveland, O.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Die Making
Firth-Sterling Steel Co., McKeesport, Pa.

MACHINERY—Draw Benches
Standard Machinery Co., Providence, R. I.

MACHINERY—Edging
Standard Machinery Co., Providence, R. I.

MACHINERY—Enameling
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Extruding
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Robertson, John, Co., Brooklyn, N. Y.
Royle, John & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, O.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Forming
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.

WHERE TO BUY, Continued

MACHINERY—Galvanizing
Lee Wilson Engineering Co., Cleveland, Ohio

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Lee Wilson Engineering Co., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
Fidelity Machine Co., Philadelphia, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

MACHINERY—Grinding, Roll
Farrel-Birmingham Co., Inc., Ansonia, Conn.

MACHINERY—Insulating
American Insulating Mach'y. Co., Phila., Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Fidelity Machine Co., Philadelphia, Pa.
National Rubber Machinery Co., Akron, O.
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Lead Encasing
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Robertson, John, Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John, Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Material Handling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

MACHINERY — Measuring Wire & Cable
Davis, R. L., Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Paper Covering Wire
Terkelsen Machine Co., Boston, Mass.

MACHINERY—Pointing
Broden Construction Co., Cleveland, O.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Rubber for Insulating Wire
Farrel-Birmingham Co., Inc., Ansonia, Conn.
National Rubber Machinery Co., Akron, O.
Royle, John & Sons, Paterson, N. J.

MACHINERY—Rubber Strip Covering
Farrel-Birmingham Co., Inc., Ansonia, Conn.
National Rubber Machy. Co., Akron, O.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
Farrel-Birmingham Co., Inc., Ansonia, Conn.
National Rubber Machy. Co., Akron, O.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y. Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
National Rubber Machy. Co., Akron, O.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I. (Special Designs)
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., The, Cleveland, O.
Moslo Machinery, Inc., Cleveland, O.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Shuster, F. B., Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Stranding
National Rubber Machy. Co., Akron, O.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, O.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Swaging
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing
Entwistle, James L., Pawtucket, R. I.
Scott, Henry L., Co., Providence, R. I.

MACHINERY—Testing Size of Wire
Davis, R. L., Electric Co., Wallingford, Conn.

MACHINERY—Testing—Spring
Standard Machinery Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Welding Wire
Micro Products Co., Chicago, Ill.
Shuster, F. B., Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.

MACHINERY—Winding
American Insulating Mach'y. Co., Phila., Pa.
Entwistle, James L., Pawtucket, R. I.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt, Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Insulating Mach'y. Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
Cook, John, Engr. Co., Paterson, N. J.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Rope
National Rubber Machy. Co., Akron, O.
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
American Insulating Mach'y. Co., Phila., Pa.
New England Butt, Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MACHINERY—Wrapping Wire
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

MILLS—Rod, Bar, etc.
Farrel-Birmingham Co., Inc., Ansonia, Conn.

MILLS—Strip, Hot and Cold For Iron, Steel, Copper, Brass, etc.
Farrel-Birmingham Co., Inc., Ansonia, Conn.

MILLS—Tandem Rolling and Edging
Standard Machinery Co., Providence, R. I.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

OILS—Wire Drawing
Standard Industrial Compounds Co., Chicago, Ill.

OVENS—Industrial
Carl-Mayer Corp., Cleveland, Ohio.
Ross, J. O., Engineering Corp., New York, N. Y.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Penna.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Crepe-Kraft Co., Inc., Newark, N. J.

PAPER TESTERS—
Scott, Henry L., Co., Providence, R. I.

WHERE TO BUY, Continued

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS
American Chemical Paint Co., Ambler, Pa.

PLASTIC TESTERS—
Scott, Henry L., Co., Providence, R. I.

POTS—Lead Melting
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Robertson, John, Co., Brooklyn, N. Y.

PRESSES—Hydraulic and Mechanical
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Providence, R. I. (Mechanical Only)

PRESSES—Lead
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Pa.

PULLERS—Wire
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

RECORDERS—Fault and Reel
Entwistle, James L., Pawtucket, R. I.

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Moslo Machinery, Inc., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, O.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Constant Tension
Farrel-Birmingham Co., Inc., Ansonia, Conn.

REELS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS AND SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Takeoff
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Inc., Cleveland, O.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B. Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Vulcanizing and Impregnating
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products, Co., Niles, O.

REELS—Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, O.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products, Co., Niles, O.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS
Carl-Mayer Corp., The, Cleveland, O.
Moslo Machinery, Inc., Cleveland, O.
Ross, J. O., Engineering Corp., New York, N. Y.

RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.

ROLLS—Iron, Steel, Alloy
Farrel-Birmingham Co., Inc., Ansonia, Conn.

ROLLS—For Strip, Rod, Bar Mills
Farrel-Birmingham Co., Inc., Ansonia, Conn.

ROLL STRAIGHTENERS—
Moslo Machinery, Inc., Cleveland, O.

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott, Henry L., Co., Providence, R. I.

RUST PROOF COMPOUND—
American Lanolin Co., Lawrence, Mass.

SOAPS—Industrial and Wire Drawing
Miller, R. H., Co., Homer, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

SPARK TESTING EQUIPMENT—
Entwistle, James L., Pawtucket, R. I.

SPOOLS—Annealing and Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Chicago, Ill.

SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

STAMPINGS—Steel
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Brass and Non Ferrous
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.

STRIP METAL TESTERS—
Scott, Henry L., Co., Providence, R. I.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TAKE-UPS FOR CABLE, HOSE, LEAD PRESSES AND SHEET RUBBER—
Entwistle, James L., Pawtucket, R. I.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

TENSILE TESTERS—
Scott, Henry L., Co., Providence, R. I.

TESTING INSTRUMENTS—
Entwistle, James L., Pawtucket, R. I.
Scott, Henry L., Co., Providence, R. I.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS—
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS—
Ruesch, H. J., Machine Co., Newark, N. J.

TURKS HEAD—Friction and Power Driven
Standard Machinery Co., Providence, R. I.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y. Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Micro Products Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, O.

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE DRAWING — High Grade Custom
Hy-Carbo Steel Co., Lowell, Mass.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Enameled For Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Metal Shielded
Precision Tube Co., Philadelphia, Pa.

WIRE—Nickel Silver and Phosphor Bronze
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Non Ferrous to Specification For Special Purposes
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Stainless Steel
Callite Tungsten Corp., Union City, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE TESTERS—
Scott, Henry L., Co., Providence, R. I.

WIRE, WEAVING—Non Ferrous
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Crepe-Kraft Co., Inc., Newark, N. J.

YARN TESTERS—
Scott, Henry L., Co., Providence, R. I.

HUDSON WIRE CO. PLANT AT OSSINING, N. Y.

HUDCO

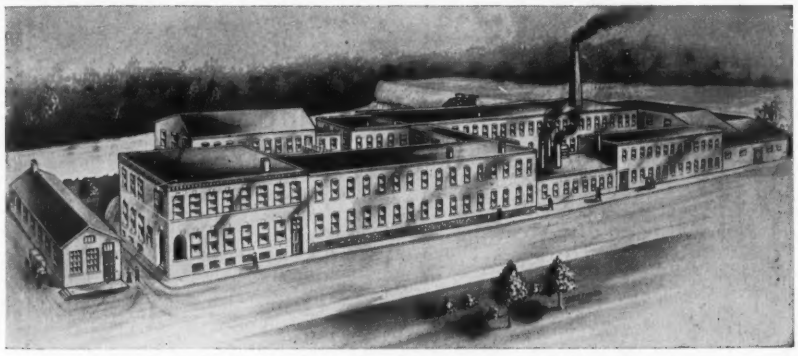
FINE WIRES IN ALL METALS

TWO MODERN AND COMPLETE WIRE PLANTS—— AT YOUR SERVICE——

LET US QUOTE ON YOUR WIRE REQUIREMENTS

WINCO

LEAKPROOF ENAMELLED WIRE



Winsted Divn. of HUDSON WIRE CO. at Winsted, Conn.

HUDCO

FINE BARE WIRES

High Brass, Low Brass, Zinc 99.99+ and High Tensile Zinc, Commercial Bronze, Phosphor Bronze, Pure Tin, Lead, Antimonial Lead, Tinsel Lahns, Silver Plated Copper, False Gold and Copper.

Cadmium, Nickel Silver, 10%, 18% and 30%; Silver Plated Copper, False Gold and Special Brass and Bronze Alloys to Specification. Metallic Fibre for Packing Purposes, Copper, Bronze, Zinc, Lead and Aluminum.

WIRES FOR METAL SPRAYING

Pure Lead, Lead Alloy, Pure Zinc, Zinc Alloy, Copper, Tin, High Brass, Low Brass, Solder Wire, High Conductivity, Electric Wire.

Cadmium, Nickel Silver, (10%, 18%, 30%); Aluminum, Monel Metal, Phosphor Bronze, Pure Nickel, Commercial Bronze.

"HUDCO" specially processed Copper Wire for enamelling purposes is drawn from Selected Copper, insuring the maximum conductivity. This is but one example of the use of the most advanced and approved materials and methods in our processing. BETTER WIRE AT LOWER COST.

LET US QUOTE

HUDSON WIRE COMPANY

OSSINING, N. Y.

SUCCESSORS ROYLE & AKIN

ESTAB. 1902 ESTAB. 1902

WINCO

LEAKPROOF ENAMELLED WIRES

Drawn from special oxygen-free copper that works so clean, so free from slivers, that enamelling is perfect. Leaks positively prevented. Every foot of WINCO enamelled wire is mercury tested before shipment to assure a wire perfect in every particular.

WINCO enamelled wire is covered to the same dimensions as fabric-covered wire so the user need not change his equipment. It will withstand softening in varnish-dipping and baking.

WINCO enamelled wire is lower in cost than silk covered wire. Write for sample.

LET US QUOTE

WINSTED DIVISION

HUDSON WIRE COMPANY

WINSTED, CONN.

BRIGHT

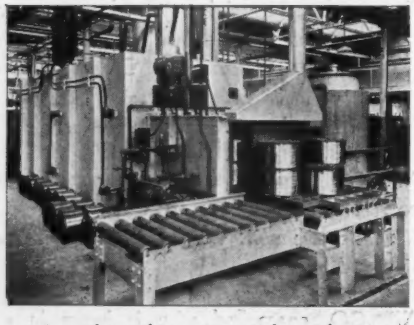
and DRY

From EF Continuous Special Atmosphere Furnaces

Built by The Electric Furnace Company

★ Ferrous and non-ferrous wire—from the finest gauges to the heaviest sizes — is bright annealed uniformly and economically in various types of controlled atmosphere furnaces we have built.

Coiled wire, as well as wire on small spools and large reels, is successfully handled in these furnaces. No water seals, steam or vapor of any kind is used, thus staining is entirely eliminated and no drying necessary. The wire is discharged from these furnaces uniformly annealed, absolutely bright and dry, ready for shipping, further processing or fabricating. The installation shown below is one of several types of electric and fuel-fired furnaces we have developed for the wire industry.



A special atmosphere continuous pusher type furnace for bright annealing both heavy and fine copper wire on large reels, on spools and in coils

Other recent installations include furnaces for bright and clean annealing brass, nickel silver and copper wire; improved pit type furnaces for normalizing rod and bright annealing steel wire in coils, as well as furnaces for scale-free hardening bolts, springs, etc., furnaces for billet heating, bright annealing tubing, strip, stampings; carburizing, copper brazing and other heating and heat treating processes.

If you are interested in improving the quality of your anneal or heat treatment, increasing production or are contemplating any changes or additions to your furnace equipment, our engineers will be glad to work with you. We specialize in building production furnaces to fit the customer's specific requirements — for any heating process — for any product or production.

Ask for our 8-page leaflet showing various types of electric and fuel fired furnaces we have built for the wire industry.

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production